MOTOR AGE

JUNE 4 1914

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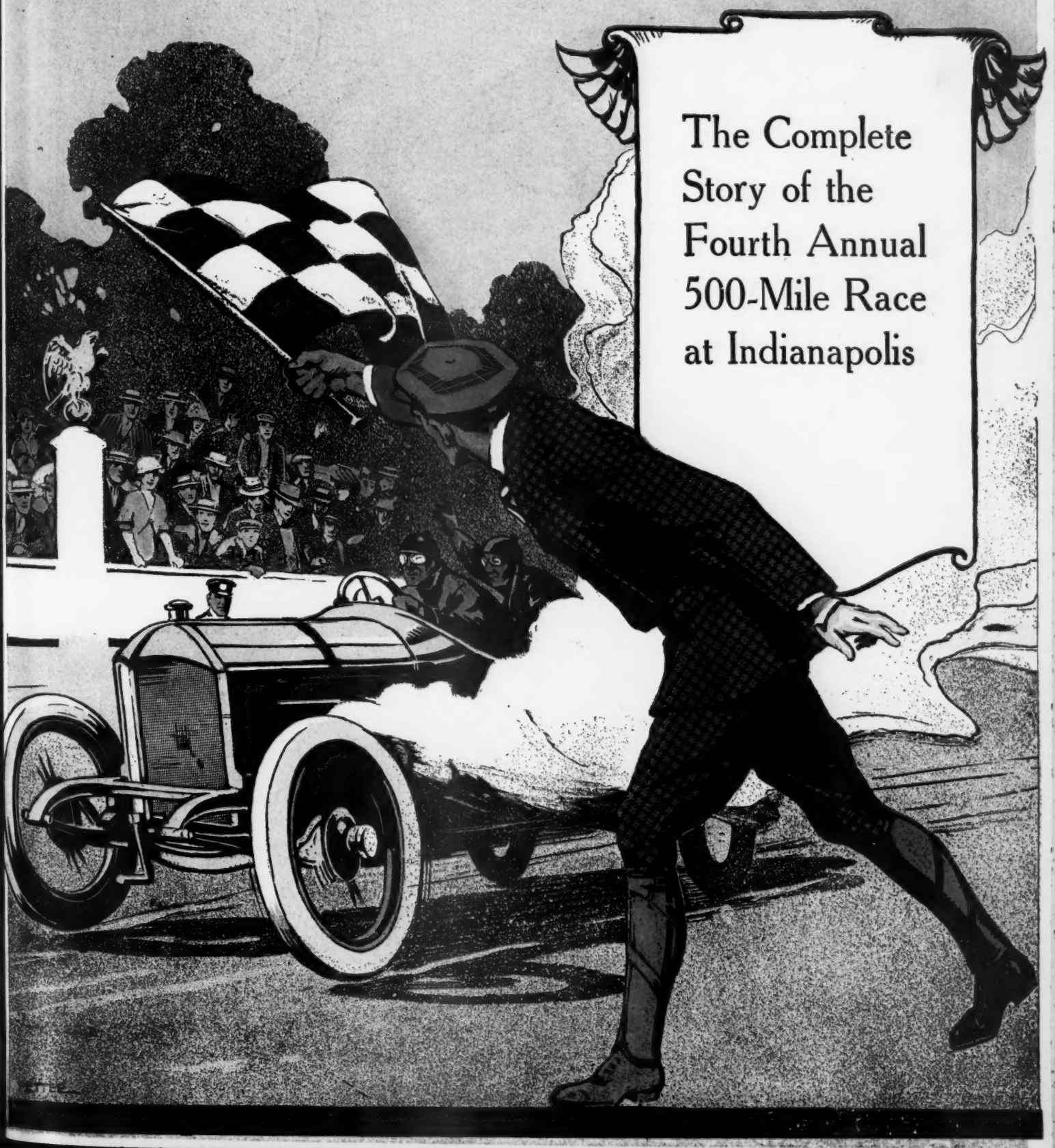

The Complete Story of the Fourth Annual 500-Mile Race at Indianapolis

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The BROWN Oil-Box

THE Brown Oil-Box feeds oil automatically to the intermediate surfaces of leaf springs by the force of capillary attraction. Within a short time after applying the Brown Oil-Box to a spring, no matter how rusted the leaves may be, the intermediate surfaces will become as clean and well oiled as though the job had been done by hand.

Facts About the Oil-Box

The Brown Oil-Box stops squeaks. It won't wear out. It requires very little attention. You can insert enough oil from the outside to keep the springs well lubricated for more than a month. The Brown Oil-Box is easily attached. It is light in weight. It is pleasing to the eye. It is moderately priced. In fact, it is one of the most remarkably efficient devices placed on the market in recent years.

WHAT A TAXICAB COMPANY THINKS OF THE OIL-BOX

Taxicab companies operate for profit. Any new method or appliance adopted by them must be the means of increasing or maintaining that profit. And as they are able to measure profit, whatever is adopted by a taxicab company is usually of considerable merit. The Brown Oil-Box has been thoroughly tested by one of the largest taxicab companies in the middle west, The Cleveland Taxicab Company. We shall be pleased if you will write to them for their opinion.

IMMEDIATE RESULTS

Immediately after applying the Brown Oil-Box to a spring, the oil begins to work out the rust and polish the surfaces of the leaves.

And it does the work more thoroughly than it ever would be done in a repair-station.

Moreover, the cost of completely equipping your car with Brown Oil-Boxes is no more than the cost of having the springs overhauled, polished and oiled ONE time. And Brown Oil-Boxes will outlive your car, while the old method of cleaning and oiling springs must be repeated from time to time at considerable expense.

Oil-Boxes Are Essential

Resilient springs are essential to easy riding. They are essential if you wish to relieve the motor from destructive vibration. They are essential if you wish to obtain from your car the greatest amount of operating-economy, car-efficiency and riding-luxury.

If you want to enjoy the maximum pleasure of motoring you cannot afford to operate your car another day without equipping with Brown Oil-Boxes. If you want to operate your car at the lowest possible cost—keep the repair bills down to minimum—you need Brown Oil-Boxes.

Brown Trafilog Co.
Rose Bldg., Cleveland, Ohio

$1 SPECIAL OFFER

Brown Oil-Boxes are made in various sizes to fit the springs of the many makes and models of automobiles. They are attached to the springs by bolts, as shown in the illustration.

For the purpose of giving the public a chance to try out the Brown Oil-Box, we are going to sell one thousand at the low price of one dollar each. Later, we shall sell them only in sets, and shall have to ask a higher price.

So if you will fill out the attached coupon and send it to us with one dollar in currency, stamps, check or money order, we shall forward to you one Brown Oil-Box, postpaid. You can attach it to any one of the springs on your car, and if after thirty days' trial, it hasn't done all we claim, you can return it at our expense and we'll gladly refund you the dollar.

TO THE DEALER—

The one thousand Oil-Boxes to be sold at the special price of one dollar is not a dealer offer. For dealers we have set aside a limited number of Oil-Boxes at a very special introductory price. If you are a dealer, repairman, or garage owner, you need send no money. Write to us on your business letterhead giving the size and quantity of Oil-Boxes you can dispose of.

Brown Trafilog Co., Rose Bldg., Cleveland
Gentlemen: Enclosed find $1.00 for which please send me a Brown Oil-Box to fit a
Model .....
Make .....
Date .....
Name .....
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MOTOR AGE

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Volume XXV June 4, 1914 No. 23

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DEPARTMENTS

Vol. XXV, No. 23 Chicago, June 4, 1914 $3.00 Per Year

MOTOR AGE

FRENCH DELAGE WINS 500 MILE RACE

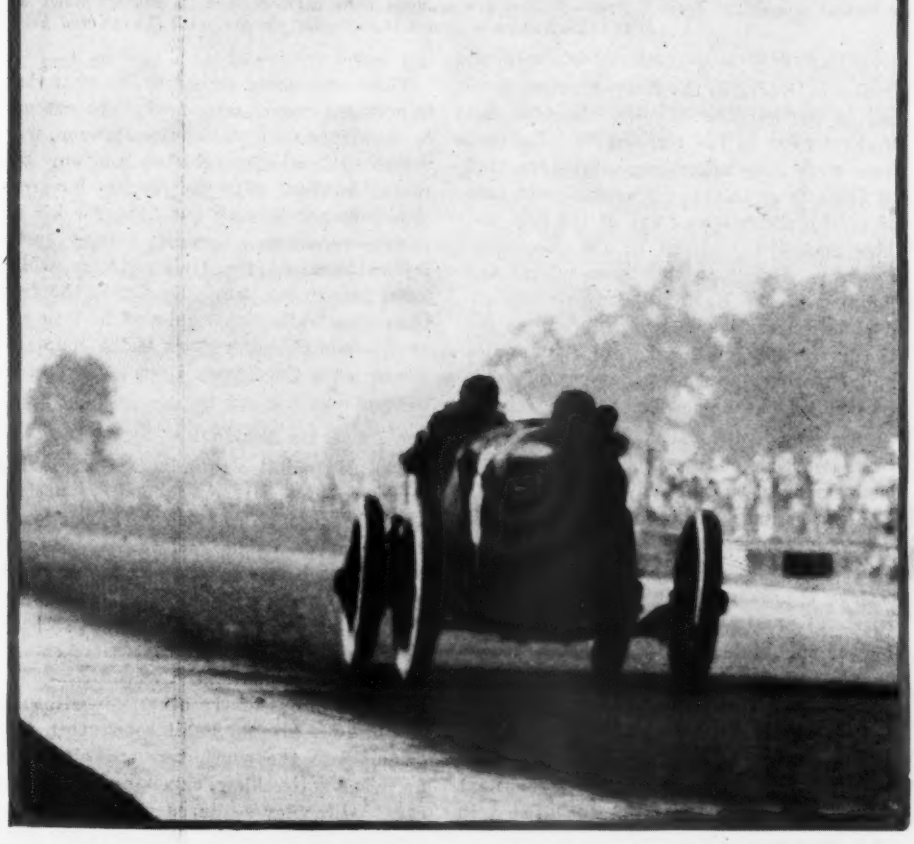
RENE THOMAS

The Prize Winners

Car and driver	Time	M.P.H.	Prize
Delage, Thomas	6:03.45	82.47	$20,000
Peugeot, Duray	6:10.24	80.99	10,000
Delage, Guyot	6:14.01	80.20	5,000
Peugeot, Goux	6:17.24	79.41	3,500
Stutz, Oldfield	6:23.51	78.15	3,000
Excelsior, Christiaens	6:27.24	77.44	2,200
Sunbeam, Grant	6:36.22	75.69	1,800
Beaver Bullet, Keene	6:40.57	74.82	1,600
Maxwell, Carlson	7:02.42	70.96	1,500
Duesenberg, Rickenbacher	7:03.34	70.83	1,400

Also Finished

Car and driver	Time	M.P.H.
Mercedes, Mulford	7:11.20	69.55
Duesenberg, Haupt	7:29.58	66.67
Keeton, Knipper	7:36.42	65.65

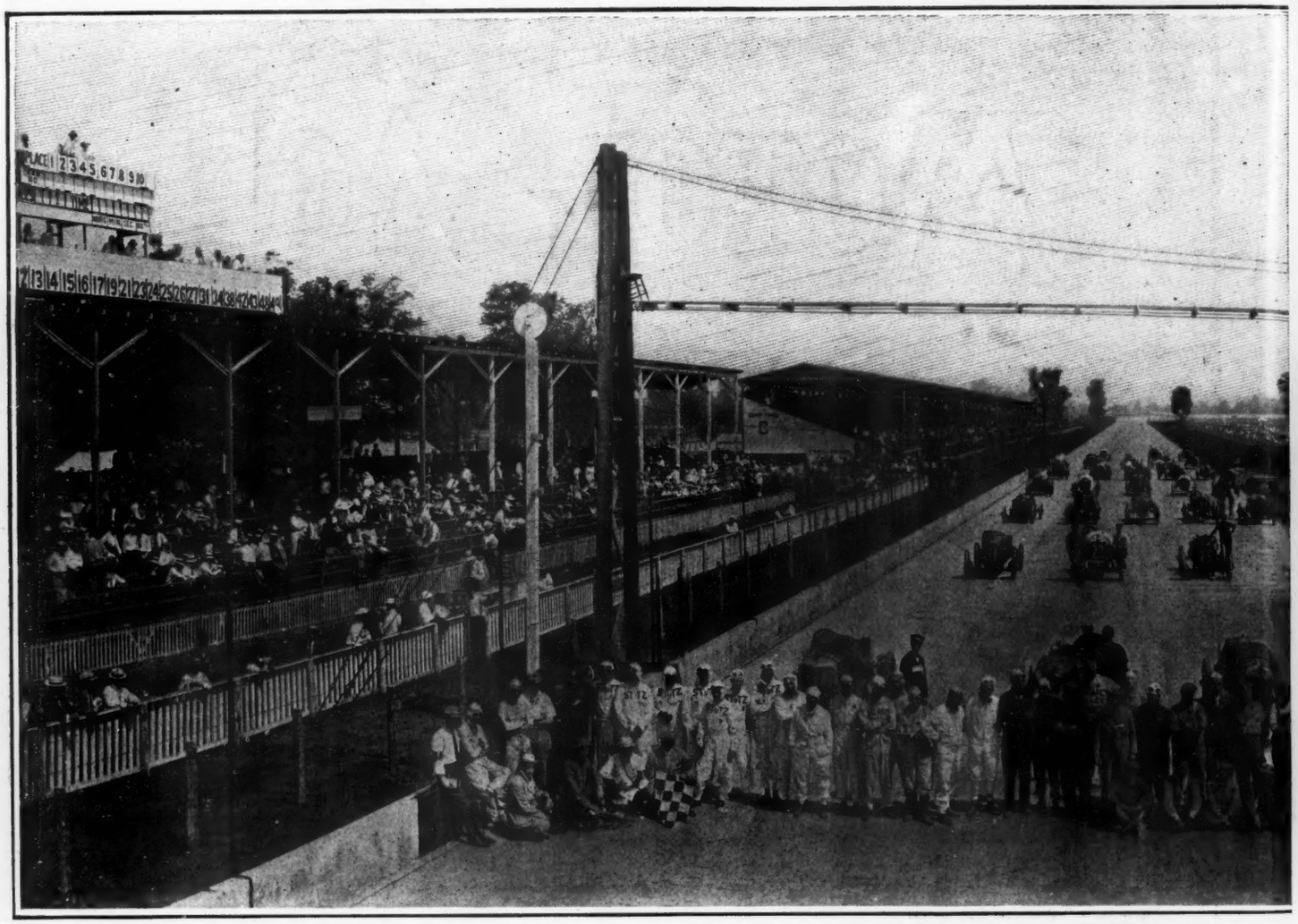


STARTER HAY ON THE BRIDGE GIVING THOMAS THE CHECKERED FLAG

By C. G. Sinsabaugh

INDIANAPOLIS, Ind., June 1—Crossing the seas to fight out their feud of long standing which the road races of Europe have been unable to settle, the Delage triumphed over the Peugeot in the fourth annual international sweepstakes Saturday, run off on the Indianapolis motor speedway. At the same time Delage also won the American classic, humiliating a large field of American entrants, who had hoped that by the turn of Fortune's wheel maybe one of their number might be lucky enough to pull down the big end of the $50,000 purse.

Vain hope! The foreigners not only won the race, but also captured second, third, fourth, and sixth while another foreign car—the Sunbeam, driven by an American, Grant—was seventh. Counting actual cash as pulled from the speedway purse of $50,000, the foreign drivers captured $40,700, leaving only a scant $9,300 to be divided among the five American pilots. Last year was a foreign landslide when the Europeans collected $26,500 with



Not the least interesting of all the formalities that precede the start of the 500-mile race is the official photograph of the drivers, mechanics and officials, esting details. The actors in this speed drama are strung across the track. Back of them are grouped their cars, each in its allotted place. Above them is the of the illustration is shown the officials' pagoda, with the covered porch for the newsp

Goux's first, Guyot's fourth and Pilette's fifth, but this year's humiliation of the American speed kings was even greater.

Record for Race Broken

Added to this was still another humiliation—the 500-mile speedway record of 78.7 miles per hour was smashed not only by the winner but by the three other foreigners who followed him home, the top-notch figure being 82.47 miles per hour.

Rene Thomas was the bright particular star, the quiet, methodical driver, who had said he would average 83 miles per hour and who made good. When he got the checkered flag from Starter Tom Hay he was six laps ahead of his closest rival, Arthur Duray in the 183-inch Peugeot. Guyot, his Delage team mate, was running two laps back of Goux, while Goux, last year's winner, was a lap back of Guyot. Oldfield, the only American within gunshot, was twelve laps back. So there was no questioning the grand victory of Thomas.

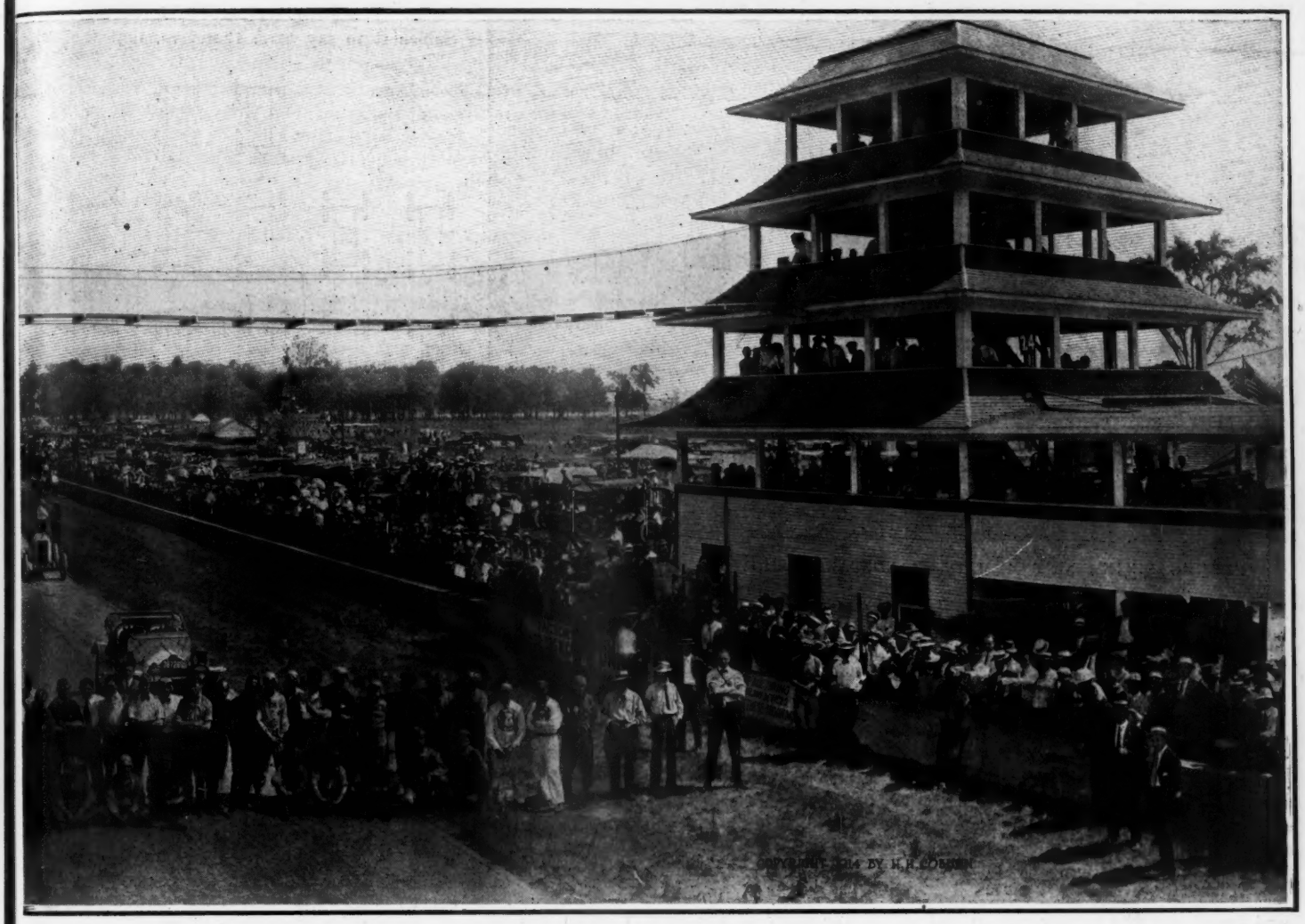
Back of Oldfield came the stragglers, the drivers who were fighting for a piece of the money and who were not factors in the fight for first place—Christiaens in the Belgian Excelsior, Grant in the English Sunbeam, Keene in the Beaver Bullet, Carlson in the kerosene-burning Maxwell and Rickenbacher in the Duesenberg. Back of them were three others who were permitted to finish so as to prevent confusion in case of a disqualification of any of the first ten. This included Mulford in the Mercedes-Peugeot. Haupt in the Duensenberg and Knipper in the Keeton. Mulford was under the impression he was running to get the last money, just as he did 3 years ago, and consequently he was disgusted when he was told he finished eleventh.

In a way it differed from previous races in that it lacked the sensational features that thrilled the multitudes in other years. There was no last-lap battle as in 1911 when Harroun nosed out Mulford, nor did the leader blow up at the end as did de Palma in 1912, letting Dawson take the race. It was more like 1913, when Goux led the field and carried the lilies of France to their first international speedway victory. The lilies still are unsullied and unless the Americans take the racing situation more seriously they will continue to wave from the flag pole when the next Indianapolis race passes into history in the summer of 1915.

There were more accidents this year than in previous events, one of which threatened to terminate fatally. In this Dawson, winner in 1912, was brought low and now lies in the hospital with the doctors hovering over him but holding out hope for his ultimate recovery. Dawson turned turtle trying to avoid the Italian Isotta which had upset in his path. Earlier in the fray Chassagne's English Sunbeam had turned over, while Cooper's Stutz lost a couple of wheels at a time when it was a factor in the battle.

Joe Dawson's Accident

The Marmon-Isotta mixup was the big sensation of the race. Gilhooley got into the race through the eleventh-hour withdrawal of de Palma's Mercedes. He had been warned once by the officials for holding the extreme outside of the track while running at a comparatively slow pace, which made it hard for the faster cars to pass him. Evidently the warning went in one ear and out of the other, for Gilhooley lapsed into his old habit soon after. He swung into the south turn, running high up, when a tire blew, capsizing the Italian car. Gilhooley's dazed mechanic was crawling up the bank. Wilcox in the Gray



fficials, taken from a huge ladder-platform on a motor truck in the center of the track by H. H. Coburn. Herewith is the result shown in all its inter- is the new bridge erected for the starter, from which point of vantage he can control the drivers and apprise them of their movements. To the right newspaper men. To the left are some of the grandstands just filling up

Fox dodged him and Dawson started to cut through between the mechanic and the outside wall when he saw he could not make it without hitting the man.

To avoid this Dawson swung down the bank and tried to cut back again, but the Marmon turned over, flinging Dawson and his mechanic. Dawson was the most seriously hurt of the four involved in the wreck, but he had saved the life of poor Bonini.

Chassagne escaped from his accident with a few bruises, the worst being a cut under the eye, caused by the breaking of his goggles. This, however, did not inconvenience him any, but his car was out because of the accident which was caused by the breaking of a wood wheel. Cooper's Stutz, which was driven by his relief, Rader, at the time, broke two wood wheels following a tire blowout which ran the car off into the soft going on the inside.

Boillot Put Out

Boillot, the European champion, also was put out through an accident. In the lead and looking a possible winner, he threw a tire. Strangely enough the tire rebounded, striking Boillot on the arm, bruising it. Also it tore off the Frenchman's necktie. The accident resulted in a broken frame which most effectually stopped the Peugeot and left it up to Duray and Goux to uphold the reputation of the house.

Weather Ideal for Race

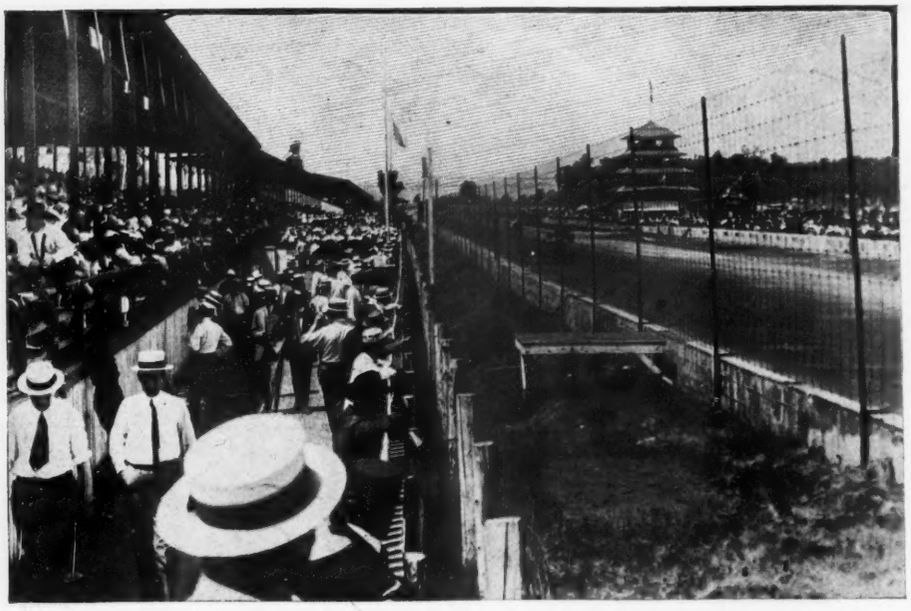
The morning of the great race brought a surprise to everyone. The night before it looked threatening and indeed it showered once. But Carl Fisher's luck stood by him and the great day dawned most auspiciously. A cooling breeze was blowing, the sky was clear of clouds and as early as 7 o'clock a huge crowd was clamoring at the gates for admittance. This advance guard predicted a smashing of attendance record, which was verified before the day was over. Despite the fact that 10,000 additional seats had been provided, there were few empty spots in the huge stands by the time the race really was under way, and by noon it was said that last year's figures had been exceeded by 20,000, the estimate of the attendance being placed at close to 125,000.

All preparations had been made for the efficient handling of the contest and there wasn't a slip made in getting the field into motion. The usual brake tests were held and everyone qualified. Then came the grouping of the drivers, mechanics and officials for the big photograph. Then there was the parade of the drivers, each being followed by an introduction to the crowd after which the cars were located in position for the start itself.

The start differed from those of previous years in that the principle of safety first so far as the starter is concerned was adopted. There were none of the sensational features of other races, with the starter dancing around in the smoke and dodging the cars. Instead Tom Hay was safely located on a bridge that ran high over the track and from this vantage point he controlled the field most effectually and at the same time he was where every driver could see him.

The Start Interesting

The other preliminaries to the start were the same as before. There was the usual paced lap to get everyone in motion with Carl Fisher acting as pacemaker. With him rode Finley Porter, who held a watch in order to bring the real start as close to 10 o'clock as possible and make it easier for the timers and checkers by having the start on the even hour. It proved out, the big field getting under way on the



PROMENADE IN FRONT OF MAIN GRANDSTANDS, SHOWING THE SAFETY ZONE

real journey within a couple of seconds of 10 o'clock.

Thirty cars started in the race, but not the exact thirty that qualified. There was one change, Gilhooley in the Isotta slipping into the field through the withdrawal of de Palma and the Mercedes which was entered by E. C. Patterson. De Palma scratched on Friday morning, pleading that the excessive vibration of the motor, apparently due to lack of proper balance, made it foolhardy to attempt the race. The technical committee examined the car and found that the trouble was as bad as de Palma claimed it was and accordingly excused him. De Palma stated that it would be impossible to drive any distance without taking chances.

Pullen's Mercer Excused

The withdrawal of the Mercedes left Pullen in the little Mercer next in line, but the grand prix winner was not ready. Referee Pardington went into the details of the matter and was convinced that it was as Pullen had stated, so he excused the Mercer and let in Gilhooley.

The story of the race in detail will be found in another section of Motor Age. Suffice it to say here, therefore, that the

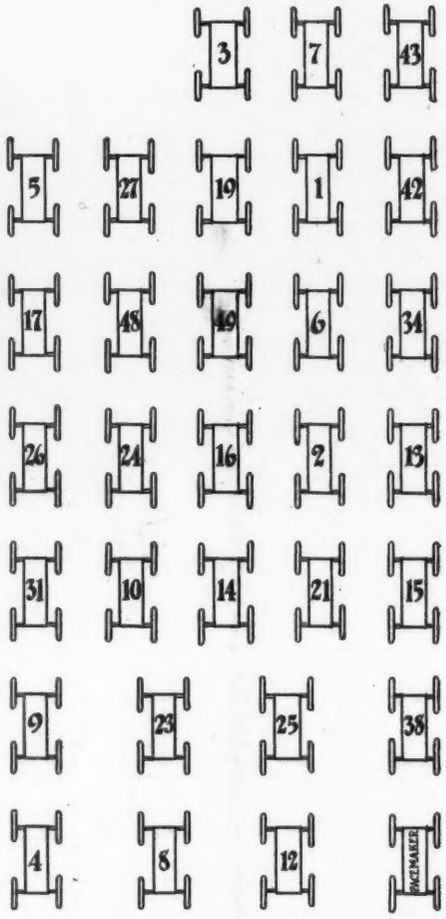


CHART SHOWING STARTING POSITIONS OF THE THIRTY CARS

TABLE SHOWING TIMES FOR EACH EIGHT LAPS OF THE FOURTH INTERNATIONAL 500-MILE SWEEP-

Car No.	Car and Driver	No. Cylinders	Bore and Stroke, Inches	Piston Displ.	Laps 8 Miles 20	16 40	24 60	32 80	40 100	48 120	56 140	64 160	72 180
16	Delage, Thomas	4	4.13x7.08	380.2	14:27.43	29:15.70	41:19.20	57:28.35	1:11:21	1:25:29	1:42:47	1:56:55	2:11:20
14	Peugeot, Duray	4	3.07x6.18	183.0	14:59.51	29:32.95	41:38.95	56:48.60	1:10:46	1:24:59	1:39:15	1:53:16	2:10:40
10	Delage, Guyot	4	4.13x7.08	380.2	14:37.81	28:34.40	41:43.75	57:00.00	1:11:07	1:25:12	1:39:18	1:53:24	2:07:20
6	Peugeot, Goux	4	3.94x7.08	345.0	16:32.56	30:13.95	46:41.30	1:00:26	1:14:25	1:28:32	1:42:38	1:57:55	2:12:13
3	Stutz, Oldfield	4	4.80x6.00	434.3	13:58.14	30:33.10	43:09.85	59:58.50	1:14:58	1:30:13	1:46:46	2:00:14	2:15:00
9	Excelsior, Christiaens	6	3.80x6.20	446.6	14:21.72	28:19.25	41:22.85	56:50.05	1:11:14	1:26:01	1:41:03	1:56:35	2:14:13
27	Sunbeam, Grant	6	3.14x5.90	273.0	15:37.85	30:22.25	48:29.05	1:06:11	1:20:56	1:36:06	1:50:55	2:06:44	2:25:35
5	Beaver Bullet, Keene	4	5.10x5.50	449.4	14:15.85	31:22.40	46:34.40	1:02:59	1:17:52	1:36:57	1:52:14	2:07:26	2:27:29
25	Maxwell, Carlson	4	4.20x8.00	445.3	15:40.52	32:15.50	52:19.25	1:12:53	1:29:53	1:47:57	2:05:06	2:20:21	2:35:14
42	Duesenberg, Rickenbacher	4	4.40x6.00	360.5	15:35.65	31:52.15	46:25.55	59:56.10	1:14:15	1:31:08	1:46:26	2:03:01	2:18:12
23	Mercedes, Mulford	4	4.40x7.20	448.0	15:20.05	32:11.30	46:22.50	1:00:58	1:15:57	1:34:02	1:50:53	2:05:55	2:37:29
43	Duesenberg, Haupt	4	4.38x6.00	360.5	13:59.75	28:38.90	42:18.10	1:14:20	1:30:56	1:43:52	1:58:38	2:30:25	2:45:20
31	Keeton, Knipper	4	5.10x5.50	449.4	15:37:15	30:22.65	43:00.55	59:58.90	1:17:43	1:32:59	1:51:24	2:07:30	2:30:50
7	Peugeot, Boillot	4	3.90x7.08	341.7	14:32.15	29:56.50	46:54.30	1:00:43	1:15:01	1:32:11	1:47:57	2:01:59	2:15:59
34	Bugatti, Friedrich	4	3.90x7.10	350.0	16:06.50	32:19.95	50:58.55	1:06.58	1:25:43	1:44:02	2:06:46	2:22:21	2:37:55
1	Burman, Disbrow	4	5.10x5.50	449.4	14:35.43	29:52.70	42:04.50	59:24 45	1:14:32	1:30:03	1:45:28	2:01:23	2:29:08
19	Mercer, Wishart	4	4.80x6.20	448.0	14:54.41	29:30.70	41:49.45	57:04.20	1:11:15	1:25:43	1:40:49	1:57:09	2:11:40
2	Stutz, Cooper	4	4.81x6.00	434.3	15:15.31	31:36.85	47:00.85	1:01:59	1:16:52	1:31:55	1:48:15	2:02:50	2:15:32
21	Mercer, Bragg	4	4.80x6.20	448.0	14:26.62	28:20.75	41:24.10	56:52.25	1:11:17	1:27:36	1:21:46	1:56:45	2:15:11
15	King, Klein	4	5.11x5.50	449.4	15:21.10	30:29.25	49:01.45	1:04:35	1:21:24	1:36:22	1:51:47	2:07:15	2:22:49
38	Braender, Chandler	4	4.32x6.00	350.0	15:53.49	31:01.95	49:00.35	1:04:19	1:21:44	1:36:58	1:52:29	2:07:51	Out. Brok
4	Gray Fox, Wilcox	4	5.00x5.50	431.9	15:03.49	29:39.60	43:48.30	1:00:11	1:14:40	1:29:18	1:43:39	2:10:35	
13	Mason, Mason	4	4.38x6.00	360.8	17:26.40	37:17 30	55:24.60	1:08:22	1:23:33	1:38:43	1:52:10	2:11:26	
26	Marmon, Dawson	4	4.51x7.00	445.0	14:55.30	28:58.55	41:24.45	57:07.40	1:11:25	Out. Turn	ed over.		
17	Burman, Burman	4	5.10x5.50	449.4	15:26.71	35:30.10	50:09.60	1:04:41	1:19:29	Out. Brok	en connecti	ng rod.	
24	Stutz, Anderson	4	4.81x5.75	416.2	14:42.63	29:19.95	41:58.95	57:27.35	1:16:56	Out. Brok	en crankah	aft.	
49	Isotta, Gilhooley	4	4.72x6.32	441.0	15:38.83	30:28.65	43:21 20	1:00.49	1:19:47	Out. Turn	ed over.		
8	Maxwell, Tetzlaff	4	4.20x8.00	443.0	19:33.90	49:58.15	1:08.48	1:29:48	Out.	Rocker arm br	oken.		
12	Sunbeam, Chassagne	6	3.14x5.90	276.0	15:25.91	30:03.50	Out. Tu	rned over.					
48	Ray, Brock	4	5.10x5.50	449.4	Out. Brok	en cam.							

battle for world honors was the keenest of the four that have been fought on the red bricks at the speedway. It was made particularly interesting because of the intense rivalry that prevailed among the foreigners. It was as a house divided against itself. Even among the Peugeotites there was rivalry, Goux and Boillot holding aloof from Duray because he was representing a private entry. There also was a coldness between Goux and Boillot and Guyot and Thomas that is known throughout Europe and America. The Peugeot and Delage long have fought for continental supremacy and the end is not yet. It will take the French grand prix next month to settle it.

THE INFIELD LOOKING NORTH FROM THE PAGODA

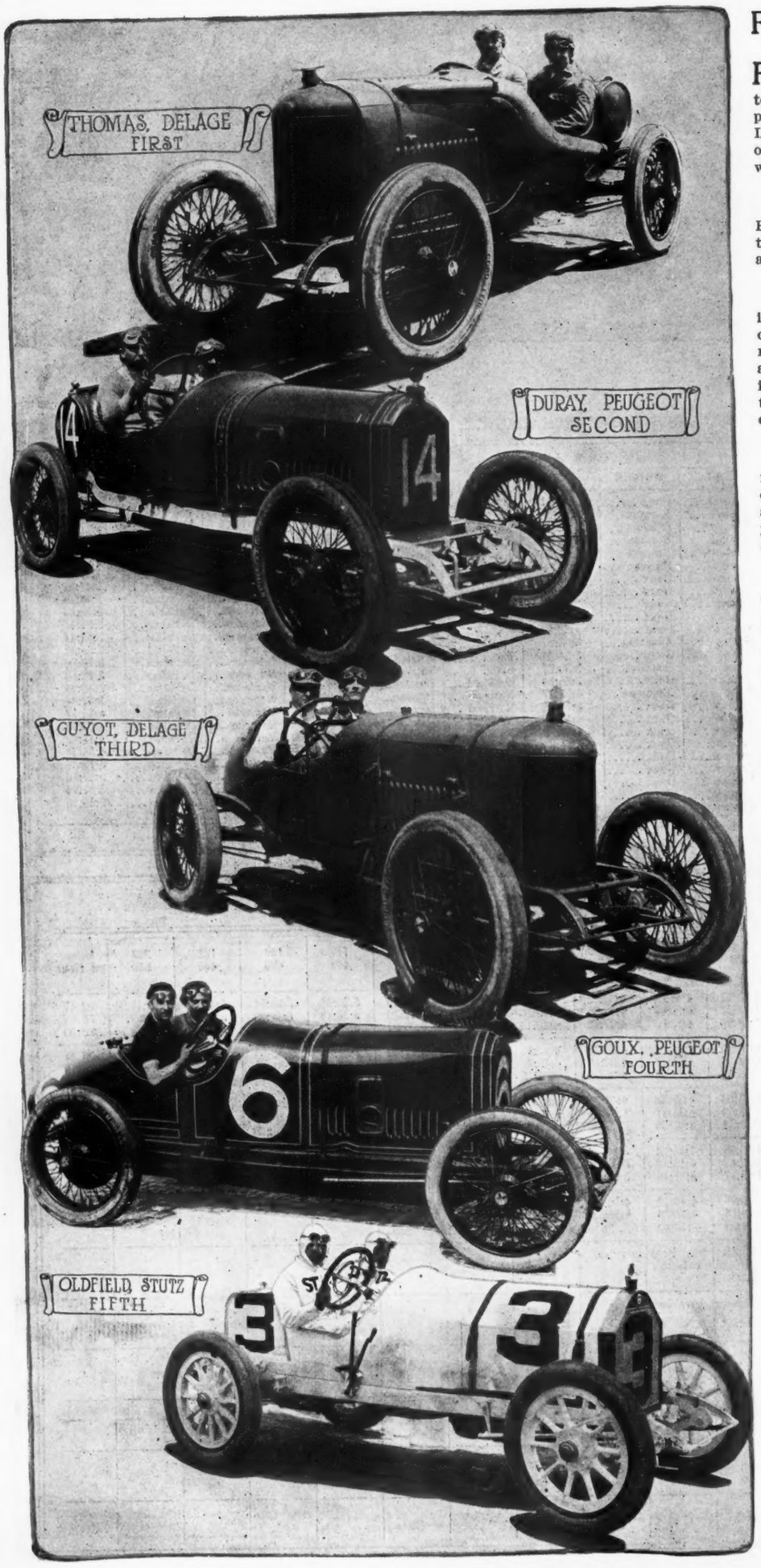
COMPARISONS OF TIMES MADE IN RACES OF 1914, 1913 AND 1912

MILES	1914 CAR	1914 DRIVER	1914 TIME	1913 CAR	1913 DRIVER	1913 TIME	1912 CAR	1912 DRIVER	1912 TIME	DE PALMA'S 1912 TIME* CAR	DE PALMA'S 1912 TIME* DRIVER	DE PALMA'S 1912 TIME* TIME
20	Stutz	Oldfield	13:58	Peugeot	Goux	15:17	Mercedes	Wishart	14:40			
40	Excelsior	Christiaens	28:19	Keeton	Burman	31:10	National	Brown	29:20	Mercedes,	DePalma	29:19
60	Delage	Thomas	38:52	Keeton	Burman	46:13	National	Brown	43:59	Mercedes	DePalma	43:59
80	Peugeot	Duray	56:48	Keeton	Burman	1:01:24	Fiat	Tetzlaff	59:08	Mercedes	DePalma	58:33
100	Peugeot	Duray	1:10:46	Keeton	Burman	1:16:35	Fiat	Tetzlaff	1:13:37	Mercedes	DePalma	1:13:01
120	Peugeot	Duray	1:24:59	Keeton	Burman	1:32:03	Fiat	Tetzlaff	1:28:10	Mercedes	DePalma	1:27:26
140	Peugeot	Duray	1:30:15	Peugeot	Goux	1:48:48	Fiat	Tetzlaff	1:42:40	Mercedes	DePalma	1:41:52
160	Peugeot	Duray	1:53:16	Peugeot	Goux	2:06:21	Fiat	Tetzlaff	1:57:05	Mercedes	DePalma	1:56:15
180	Delage	Guyot	2:07:20	Peugeot	Goux	2:21:13	Fiat	Tetzlaff	2:11:32	Mercedes	DePalma	2:10:26
200	Peugeot	Duray	2:25:11	Peugeot	Goux	2:36:07	Fiat	Tetzlaff	2:27:51	Mercedes	DePalma	2:24:47
220	Delage	Guyot	2:45:17	Peugeot	Goux	2:50:58	National	Dawson	2:47:19	Mercedes	DePalma	2:40:41
240	Peugeot	Duray	2:53:50	Stutz	Anderson	3:08:27	Fiat	Tetzlaff	3:01:49	Mercedes	DePalma	2:56:22
260	Peugeot	Duray	3:08:58	Peugeot	Goux	3:24:34	Fiat	Tetzlaff	3:16:16	Mercedes	DePalma	3:10:50
280	Mercer	Wishart	3:24:04	Peugeot	Goux	3:39:27	Fiat	Tetzlaff	3:20:51	Mercedes	DePalma	3:26:53
300	Delage	Thomas	3:38:29	Peugeot	Goux	3:56:59	National	Dawson	3:48:50	Mercedes	DePalma	3:43:21
320	Delage	Thomas	3:53:51	Stutz	Anderson	4:13:37	National	Dawson	4:03:14	Mercedes	DePalma	3:57:44
340	Peugeot	Boillot	4:07:48	Peugeot	Goux	4:28:04	National	Dawson	4:19:39	Mercedes	DePalma	4:12:17
360	Delage	Thomas	4:22:33	Peugeot	Goux	4:44:17	National	Dawson	4:37:13	Mercedes	DePalma	4:26:53
380	Delage	Thomas	4:37:45	Peugeot	Goux	4:59:22	National	Dawson	4:51:32	Mercedes	DePalma	4:41:42
400	Delage	Thomas	4:52:02	Peugeot	Goux	5:14:35	National	Dawson	5:04:14	Mercedes	DePalma	4:56:34
420	Delage	Thomas	5:06:19	Peugeot	Goux	5:31:20	National	Dawson	5:18:46	Mercedes	DePalma	5:12:27
440	Delage	Thomas	5:20:26	Peugeot	Goux	5:47:33	National	Dawson	5:36:17	Mercedes	DePalma	5:27:10
460	Delage	Thomas	5:34:51	Peugeot	Goux	6:02:35	National	Dawson	5:51:31	Mercedes	DePalma	5:43:14
480	Delage	Thomas	5:49:10	Peugeot	Goux	6:19:00	National	Dawson	6:06:50	Mercedes	DePalma	5:58:16
500	Delage	Thomas	6:03:45	Peugeot	Goux	6:35:05	National	Dawson	6:21:06			

*DePalma's time in the 1912 race is given for comparison sake. DePalma did not finish, so the records he made were not recognised by the A .A. A.

STAKES RUN AT INDIANAPOLIS MAY 30, 1914, WON BY THOMAS IN DELAGE AT 82. 47 MILES PER HOUR

80 200	88 220	96 240	104 260	112 280	120 300	128 320	136 340	144 360	152 380	160 400	168 420	176 440	184 460	192 480	200 500	Miles per Hour
2:25:43	2:41:35	2:55:42	3:10:13	3:25:00	3:38:29	3:53:51	4:07:51	4:22:33	4:37:45	4:52:02	5:06:19	5:20:26	5:34:51	5:49:10	6:03:45.94	82.47
2:25:11	2:39:49	2:53:50	3:08:58	3:24:45	3:38:54	3:55:01	4:09:49	4:23:55	4:40:10	4:57:56	5:12:30	5:26:48	5:41:03	5:55:44	6:10:29.00	80.99
2:30:58	2:25:17	2:59:44	3:14:12	3:28:51	3:43:37	3:58:20	4:13:03	4:27:46	4:40:18	4:55:09	5:08:04	5:28:43	5:43:40	5:58:56	6:14:01.75	80.30
2:26:02	2:42:25	2:56:21	3:18:22	3:34:27	3:50:29	4:04:45	4:19:23	4:32:03	4:45:45	4:59:59	5:17:45	5:31:59	5:46:00	6:01:52	6:17:24.26	79.41
2:29:51	2:44:53	2:59:52	3:16:47	3:33:56	3:49:11	4:04:38	4:20:17	4:33:13	4:48:27	5:05:38	5:21:07	5:36:25	5:51:38	6:06:49	6:23:51.54	78.15
2:29:00	2:43:55	2:59:30	3:19:47	3:34:40	3:49:47	4:06:42	4:22:24	4:36:25	4:54:12	5:11:20	5:27:09	5:42:40	5:58:19	6:11:50	6:27:24.54	77.44
2:40:42	2:55:34	3:13:33	3:28:46	3:43:53	3:59:04	4:14:08	4:29:38	4:44:34	5:03:07	5:18:17	5:33:48	5:48:51	6:05:53	6:21:09	6:36:22.70	75.69
2:40:23	2:56:59	3:11:55	3:29:15	3:43:58	3:59:01	4:18:59	4:33:31	4:47:55	5:12:09	5:28:51	5:46:21	6:00:55	6:15:25	6:24:39	6:40:57.82	74.82
2:55:04	3:11:03	3:28:30	3:45:46	4:03:47	4:19:42	4:41:54	4:57:25	5:12:24	5:27:34	5:44:13	5:59:24	6:14:44	6:29:07	6:46:34	7:02:42 60	70.96
2:35:13	2:49:55	3:07:55	3:25:12	3:43:45	4:12:12	4:30:35	4:47:12	5:01:04	5:21:30	5:34:15	5:48:55	6:03:44	6:18:25	6:33:09	7:03:34.59	70.83
2:52:14	3:07:28	3:22:51	3:37:18	3:52:29	4:08:28	4:32:33	4:45:40	5:01:00	5:16:22	5:52·15	6:07:44	6:23:28	6:39:37	6:55:26	7:11:19.70	69.55
3:05:53	3:24:42	3:41:30	4:01:48	4:18:48	4:31:35	4:53:17	5:11:46	5:26:07	5:40:37	6:03:29	6:24:40	6:39:50	6:59:54	7:14:51	7:29:57.90	66.67
2:46:35	3:02:22	3:17:50	3:35:14	3:50:38	4:12:58	4:29:28	4:40:48	4:56:06	5:19:30	5:35:05	5:50:35	6:20:34	7:07:50	7:22:42	7:36:42.67	65.65
2:30:10	2:42:04	2:56:05	3:10:10	3:24:28	3:39:19	3:54:15	4:07:48	4:24:11	Out. Brok	en frame m	ember.					
2:53:10	3:08:54	3:33:28	3:48:44	4:05:28	4:20:46	4:34:08	4:49:30	Out. Brok	en ball bear	ing on drivi	ng pinion.					
2:46:21	3:03:54	3:20:02	3:51:57	4:07:40	4:24:12	5:09:35	Out. Brok	en valve.								
2:25:49	2:41:37	2:55:49	3:09:51	3:24:04	3:38:32	Out. Broke	n camshaft.									
2:29:59	2:42:39	2:58:51	3:13:31	3:27:59	Out. Brok	en wheel.										
2:29:19	2:45:02	2:59:23	3:13:56	3:30:26	Out. Brok	en magneto	drive shaft	.								
2:39:45	Out. Brok	en valve.														
en connecti	ng rod.															



Race Echoes from the

FOR the first time in the history of the international sweepstakes, Ralph Mulford failed to finish inside the money. In 1911, the perpetual smiler finished second with the Lozier; in 1912, he trailed tenth with the obstinate Knox; and last year, he crossed the wire seventh in the Mercedes.

Among the notables that witnessed the French parade were Owen Johnson, the author; Howard Chandler Christy, the artist; and Jacques Lait, the dramatist.

Of the ten drivers to divide the $50,000 in prize money, only one, Barney Oldfield, accepted relief, the cigar-chewing veteran surrendering the No. 3 Stutz to Gil Anderson after covering 300 miles. For the second time in the history of the classic, the winner drove the entire 500 miles, Goux setting the precedent in 1913 that Thomas followed this year.

Jules Goux must be seriously considering reserving a seat on the water wagon. He drank only one quart of champagne Saturday and that at the conclusion of the race. Last year he stopped at his pits six times to take on Brut.

After rolling out of his hammock three times during the night, Charles Sedwick, director of contest, went out to inspect the track at 4 o'clock Saturday morning and found a horseshoe on the first turn. Picking up the talisman, Sedwick declared "the record will be broken," and it was.

Henry B. Joy, president of the Lincoln highway, drove down from Detroit to witness the humiliation of America in the Packard prairie schooner, in which he treks from coast to coast to inspect the ocean-to-ocean boulevard.

"Uncle John" Wilson, president of the American Automobile Association and honorary referee, was unable to be present. As a consequence, the grand old man of the A. A. A. still can make good his claim that he has never seen a motor car race.

After his Sunbeam dished a wheel and turned over early in the race, Jean Chassagne sought refreshment at a lemonade stand before going to the field hospital for medical attention.

Of the cars to finish, the Beaver Bullet burned up the most tires, Keene stopping for thirteen new casings before he got the checkered flag. Goux' Peugeot was a close second with eleven stops for tires. Of all the thirty starters, the Bugatti boomed the rubber market the most, the German entry replacing fourteen casings in 340 miles.

Rene Thomas, the winner, wasted very few seconds at the pits. He stopped but three times and lost but 14 minutes and 55 seconds in changing five tires and taking on gas and oil once. This reduced the Delage's actual running time to 5 hours, 58 minutes, 50.99 seconds.

Phil Brock's Ray was the first car to be withdrawn, being eliminated with a broken cam after it had completed four laps.

Ralph de Palma's jinx continues to make its residence in Indianapolis. For the first time in the annals of the international sweepstakes, the Italian was not a contender. He withdrew his Mercedes at the eleventh hour because of the excessive vibration of the aviation motor used in the German speed creation. Ralph watched the Gauls decide their speed

Resonant Bowl of Speed

feud from the judges' stand. He sailed for England Tuesday to drive an English Vauxhall in the French grand prix.

Ralph Mulford, like Ralph de Palma, has a jinx that hovers over the speedway. Last year, when Mulford was in a position to challenge Goux for the lead, he ran out of gas on the back stretch. In this year's race, a broken chain forced the driver of the Mercedes-Peugeot hybrid to run a mile down the home stretch for new equipment.

This year's 500-mile race brought together three drivers who in turn have boasted of traveling faster in a motor car than any other man alive—Barney Oldfield, Bob Burman and Arthur Duray. Two of the wearers of the crown for speed pre-eminence finished inside the money, Duray and Oldfield.

The Duesenbergs looked as if they were George M. Cohan's entries. They were red, white and blue striped.

Harry Grant, wearing black jersey and black driver's helmet and driving the black Sunbeam, looked as if he were cast for the role of Death in a morality play.

The first four cars to finish—Thomas' Delage, Duray's Peugeot, Guyot's Delage and Goux's Peugeot—shattered Joe Dawson's record of 78.7 miles per hour.

Pat King, brother-in-law of Charles Erbstein, entrant of the Marmon, was to have ridden beside Joe Dawson, but failed to pass the medical examination. Vere Barnes was substituted at the proverbial eleventh hour.

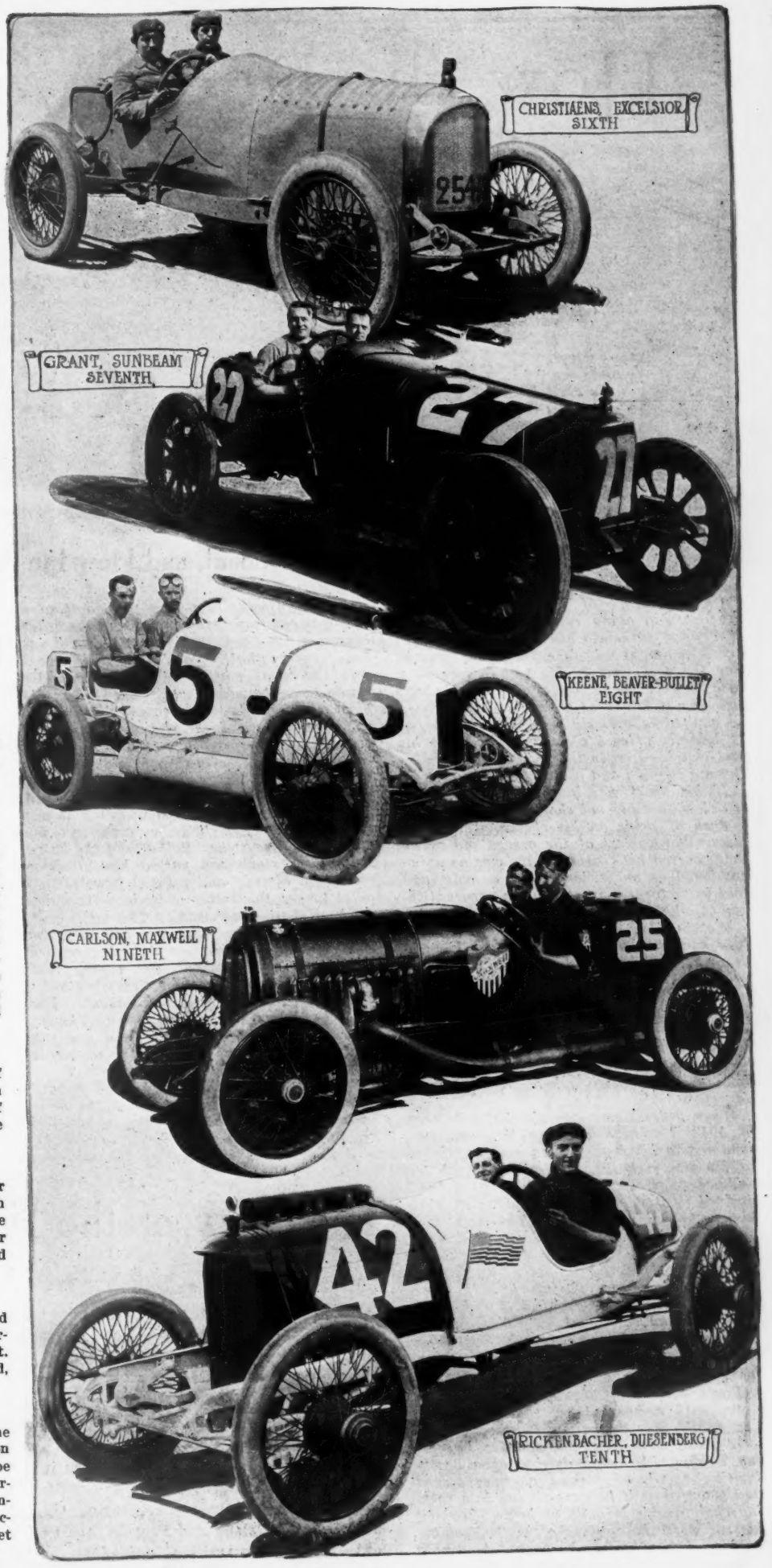
Rene Thomas figured most prominently in the awarding of the accessory prizes. In addition to the $20,000 first prize for winning, he also was given the $500 Waltham watch, the efficiency prize, for the driver who finished first, second or third and who stopped the shortest time at the pits. In all, Thomas was at the pits 4 minutes 55 seconds. In addition he collected $500 for using a Bosch magneto and $500 for using Rudge-Whitworth wire wheels. Guyot picked up $300 for using Bosch magneto and plugs. Duray was paid $250 and Guyot $125 for using Rudge-Whitworths.

Coal oil for the first time in the history of motor car racing figured as a fuel. Carlson drove to ninth place without using a drop of gasoline. Railbirds predict an immediate rise in the price of kerosene.

It was said after the race that Earl Cooper is through with the Stutz, his contract with the company expiring with the running of the sweepstakes. Gossip has it that maybe Cooper will take up the Mercer, Bragg having planned to return to Europe.

Two of the three previous winners competed in this year's race, Goux and Dawson. Harroun, the first winner, was in the Maxwell pit. All three runners-up also competed—Mulford, 1911; Tetzlaff, 1912, and Wishart, 1913.

George M. Dickson, general manager of the National company, derived some consolation out of the fact that no American car broke Joe Dawson's 500-mile record. Oldfield, first American to finish, missed it by more than 2 minutes. "It's all the more remarkable, that record, because it was made 2 years ago and yet no American car can beat it," said Dickson.



How the Race Was Run

AS THE FIELD CAME DOWN THE STRETCH THE FIRST TIME

Rene Thomas, the Unemotional, and How He Accepted Victory

AFTER years of persistent effort and heart-breaking reverses, Rene Thomas of France came into his own at the Indianapolis motor speedway Saturday afternoon. For the first time in his long career as a race driver, the pilot of the triumphant Delage was hailed as a popular idol. When he vaulted laboriously from his blue car at 12 minutes after 4 o'clock, he had won his first classic—won in the face of odds that a strange country and a strange track offered.

If his heart was bursting with joy, his smileless face did not show it. If there was a flush of pride on his cheeks, it was not discernible because of the grease and grime that covered his features. He was as unimpassioned as an ancient stoic, as calm and cold in victory as in strife, the very antithesis of what a Frenchman is supposed to be.

Wearing his checkered cap hindside before and with his broad shoulders humped over the steering wheel, Thomas had swept 200 times around the resonant brick oval in record-shattering flight. When he rolled up to his jubilant pit at the completion of his nerve-racking drive, five coveted trophies and $25,000 in prize money were his, his because of his skill and daring, but in his hour of deserved triumph he neither smiled nor spoke.

When Jules Goux won the 500-mile race of 1913, he shook with emotion and surrendered to his joy. Kisses were imprinted on his grimy cheeks. He grabbed with his numbed fingers a bottle of champagne and drained it at one gulp. But there were no kisses, no wine for Rene Thomas. Had there been, he probably would have resented and spurned them. He was deaf to the applause that shook the gray stands. His joyous pitmen and compatriots had to reach for the hand that they wished to shake. It never was offered to them. This reserve, this coldness, this modesty of the Delage driver was somewhat depressing. In victory, heroes should not act like this.

For 6 tortuous, fatiguing hours, Thomas drove with a nonchalance that must have been maddening to the desperate rivals who were pursuing the snub-nosed, defiantly roaring Delage. Although driving at a death-inviting speed, he seemed as unconcerned and peaceful as if he were sitting in a rocking chair on his veranda at home. He and his car were the epitome of methodical behavior. Lap after lap he flashed by like a monster projectile shot from the mouth of a colossal cannon. If he had marked his course on the track with chalk, he could not have kept to the line any better. He went into the turns neither high nor low. He always was traveling where the track was blackest with oil,—treacherous, slippery oil.

Thomas drove with supreme confidence. He knew the speed and stamina of his car, he trusted every part of it. He never doubted that rods and bolts would not hold, that motor and tires would fail him under the terrific strain to which he put them. There was little variation in his lap times. Even when Boillot and the hated Peugeot overtook and passed him, Thomas restrained himself and refused to allow impulse to get the better of judgment.

The 500-mile race was to Thomas a cold, business proposition. He was out after the money. He cared not for the other reward —fame. He is without the vanity that quickens the heart beats of Georges Boillot when thousands cheer his madness. The speed battle and the victory were to Thomas 6 hours of work well done. That was all. That he was the hero of two continents meant little to him.

Saturday's victory was a belated reward for persistence. Thomas reached the crest he had sought for many, many years. In France he is not admired for his brilliancy or dare-devil driving, but he is respected for his tenacity, his dogged fight against odds. Thomas always has been a fighter. Until his recent alliance with the Delage team, he had always driven inferior cars, but gotten the most out of them. He never has spared himself or his mount in a race. He don't know what it is to quit.

Thomas is more than a driver. He is a mechanician. He knows his car from radiator to tail and diagnoses a mechanical ailment quicker than any driver racing on the continent today. He acquired his technical education in the factory and garage, on the track and road. He was Experience's pupil. He learned quickly and he learned well. In France they say that he was suckled on gasoline and had tire irons for playthings.

Incidentally, Thomas is an aviator and one of the first men that carried the colors of France in the air. He was chief pilot for the Antoinette company until he got into a technical controversy with the designer and resigned in a huff. He has given exhibition flights in Italy and has been the victim of an aeroplane accident, his plane losing its wings and shooting nose down to the ground on one of his flights. He was picked up unconscious from under the debris but after he was released from the hospital he returned to the aviation field to challenge treacherous air currents and master obstinate mechanisms once more.

The Story of the Fourth Sweepstakes

By J. C. Burton

A FRENCH speed feud settled, individual honor satisfied and America humiliated to the tune of the "Marseillaise"—this in epitome tells the story of the fourth annual international sweeptstakes run at the Indianapolis motor speedway Saturday.

Records, cars and hearts were broken in 6 thrill-choked hours of a May day while five Napoleonic blue cars, bearing the nameplates of Delage and Peugeot, roared defiance at the trailing defenders of America, England, Germany, and Belgium. When the checkered flag of victory waved over the hood of Rene Thomas' Delage at 3 minutes after 4 o'clock America had suffered her second successive speed calamity in the history of the 500-mile classic.

From starting bomb to checkered flag, France was supreme. Her champions swept to the front and refused to surrender the lead that was theirs by right of speed and stamina. At the completion of 100 miles it was only a question of which make of

French car, Delage or Peugeot, would triumph. Early in the race it was evident that American cars were doomed to defeat. When Thomas rolled up to the pits a victor only six of America's defenders were running and two of these were outside the money. Thirteen cars that carried the colors of Uncle Sam stood silent at the pits and in the infield or lay on the rim of the red saucer, eliminated by mechanical faults or accidents.

Even at 10 o'clock in the morning America was skeptical but determined. For speed, her cars were outclassed. This had been proven by Goux and Boillot in practice spins and the elimination trials. Her hope of victory lay in the stamina of her defenders, on bolts and rods that might be made of sturdier stuff than those of the invading mechanisms. It was a vain hope.

American Cars Lead Twice

At only two stages during the race was an American car in front. When the first eight laps had been turned Barney Oldfield was setting the pace in the No. 3 Stutz but at the completion of another 20 miles he had surrendered this position to Christiaen's Excelsior. Americans had another opportunity to cheer when it was announced that Wishart and the Mercer were leading at the end of 280 miles. With these two exceptions the foreigners showed the way. Christiaens was in front at the completion of 40 miles and then started to drop back, fearing to attempt high speed on the slippery track with a car that had no differential. Thomas shot to the front at the completion of 60 miles but was passed in the next 20-mile stage by Duray who led up to the 160-mile mark.

For the next 60 miles Guyot and Duray alternated in holding the position of advantage, the driver of the No. 10 Delage leading at the completion of 180 and 220 miles and the pilot of the mechanical baby showing the way at 200 miles. The field took Duray's smoke from the 220 to the 280-mile post, when Wishart passed the holder of the flying kilometer record. Thomas led at the end of 300 and 320 miles to drop back behind the desperately driving Boillot in the Peugeot at 340 miles. When the twice-crowned grand prix victor was eliminated with a broken from on the one hundred and forty-eighth lap Thomas again thundered into the lead,

Joe Dawson's Heroism Feature of Big Race

ELEVEN o'clock and 100,000 speed fanatics are awaiting the next thrill of a sensation-gutted day.

A green car, with sharp, pointed hood and bearing the number 49, passes the stands. It is Gilhooley's Isotta, Italy's lone challenger in the international speed battle and an added starter whose eleventh-hour entry has been made possible by the withdrawal of de Palma's Mercedes. Compared with the five fleet blue challengers of France that thunder by with gatling-gun detonation, the Isotta seems to crawl and its smoking exhausts lack the bark of defiance.

Far down the home stretch there is a blur of yellow and white. It is the Marmon and Stutz. Joe Dawson and Gil Anderson are driving desperately in pursuit of the Delages and Peugeots. They are favorites among America's defenders. Much depends upon their skill and daring.

Almost hood to hood and wheel to wheel, the Marmon and Stutz flash across the wire as Gilhooley swings into the turn, hitting it high and hugging the concrete wall but with throttle wide open. A rear tire explodes. Brakes drag. The green car has mastered its driver. It skids, careens like a drunken monster, turns over and rattles down the embankment to end its uncertain journey in the marshes of the infield. It has tossed both its driver and mechanician from their seats. Gilhooley lies unconscious near the mass of silent steel. His helper, Lino Bonini, is stretched out on the bricks of the track, bruised, battered and dazed.

Bonini groans and raises his head. He hears the roar of the onrushing cars. He sees them bearing down upon him. On his hands and knees he starts to crawl up the slippery embankment. A curse and a prayer are on his lips. He crumples in a faint.

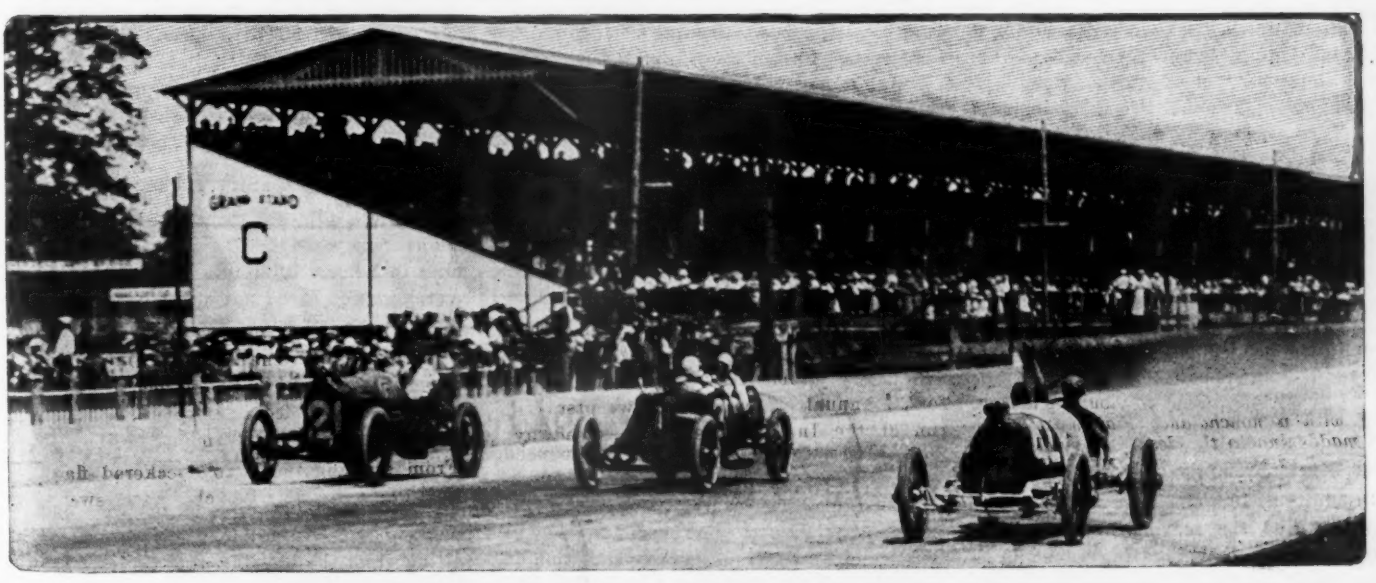
Hurtling over the bricks at an 80-mile-an-hour speed, Dawson almost is on top of the prostrate man before he sees him. A fraction of a second and the Marmon will crush him. Dawson thinks fast. With almost superhuman strength, Joe wrenches the steering wheel. The yellow car shoots down the embankment, its burning tires grazing the helpless Bonini. It jumps the track, strikes the sand at the inside edge of the brick oval and then turns over twice to claim two victims, Dawson and his mechanician, Vere Barnes, who are buried under the twisted, wrecked mechanism of speed.

Above the roar of strife, the ominous clang of the ambulance gong sounds. There is work for the surgeons to do. Dawson is taken to the field hospital with a broken collar bone, twisted back, internal injuries and body blackened by bruises—a wreck of the big-hearted boy who won the 500-mile race of 1912. He has risked his life that the life of another might be saved. "Did I hit him?" he asks of a nurse and then sinks into a coma.

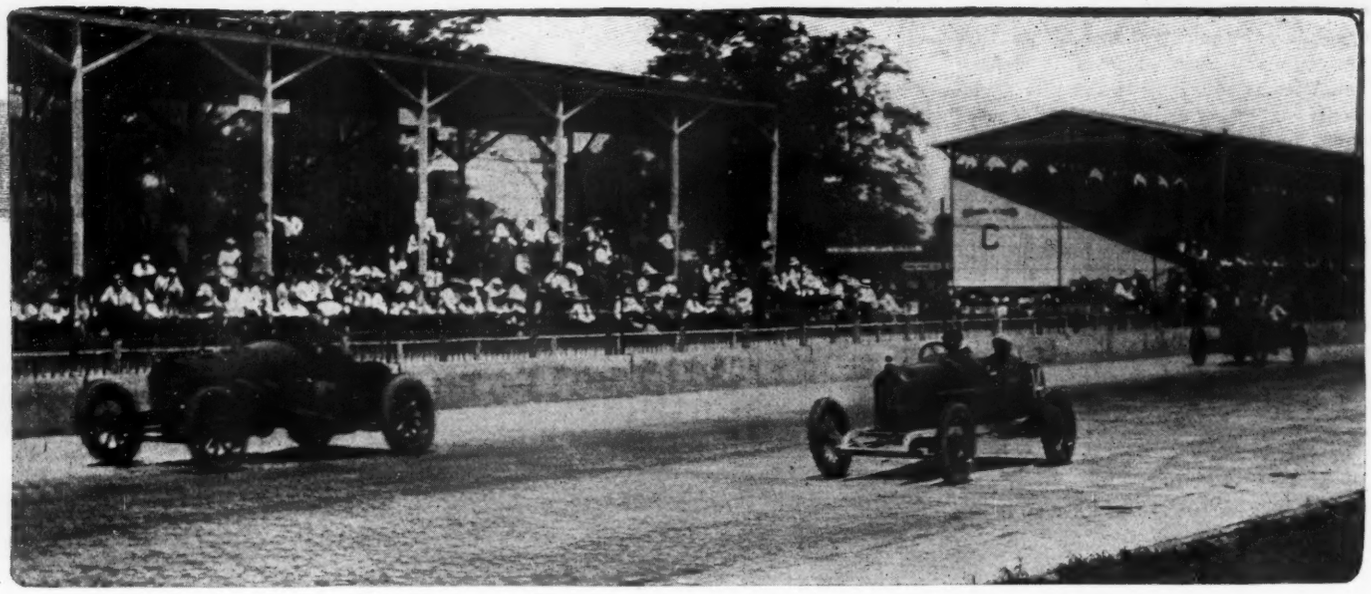
On his bed of pain, fighting off the challenge of death, Dawson to-day is the hero of the international sweepstakes of 1914. The triumph of Thomas is nothing compared with the self-sacrifice of Joe Dawson, nobleman of speed, a bruised and lacerated martyr. He wears no laurels of victory, but each bandage on his twisted and torn body is a far more priceless token of his greatness.

Joe Dawson, driver with a heart, has been put to the test before and proven himself a man. In the Vanderbilt cup race of 1910, the red Vanderbilt of motoring history, he showed that above all he was humane. Dawson then was a kid, an ambitious youngster, ready and willing to stake his all on victory. While leading the field and with only a few laps to go in the desperate chase for the historic trophy, Dawson hit a spectator on one of the turns of the poorly policed Long Island course. Instantly his lust for fame, his fondest hopes were forgotten. He stopped, vaulted from his car and ran back to the scene of the accident, refusing to continue the race until the victim was taken to a hospital for medical attention.

Joe drove slowly to the pits. Again he stopped. Tears were streaming down his grimy face. It took 2 precious minutes of pleading on the part of his helpers to induce him to re-enter the race. And what a fight he made! He lost by 24 seconds.



BRAGG ON OUTSIDE, KNIPPER IN CENTER AND RICKENBACHER ON THE POLE



MASON, DURAY AND CHRISTIAENS PASSING THE STANDS IN THE ORDER NAMED

never to be overtaken by the speed merchants in the rear.

At 9:45 o'clock a flotilla of varicolored space gourmands had been marshalled at the starting line. Six nations were represented—France by three Peugeots and two Delages; England, by two black, cigar-shaped Sunbeams; Belgium, by the orange Excelsior; Germany, by the diminutive Bugatti and Mulford's Mercedes equipped with a Peugeot motor; Italy by the green Isotta, and the United States by three white Stutzes, two yellow Mercers, two red, white and blue striped Dussenbergs, two blue Burmans, the red Keeton, two black Maxwells, the Gray Fox, the Beaver Bullet, the King, Dawson's Marmon, the Braender Bulldog and the Ray. The Isotta was allowed to start at the proverbial eleventh hour when Dalph DePalma decided to withdraw his Mercedes, after coming to the conclusion that the aviation engine which it carried would not withstand the terrific vibration to which it would be submitted. Pullen's Mercer had turned a faster lap in the elimination trials than the Italian entry but the 1914 grand prize victor refused to start.

The thirty cars were lined up in seven rows in the following order:

First row—Chassagne's Sunbeam, Tetzlaff's Maxwell and Wilcox's Gray Fox.
Second row—Chandler's Braender Bull Dog, Carlson's Maxwell, Mulford's Mercedes and Christiaen's Excelsior.
Third row—Klein's King, Bragg's Mercer, Duray's Peugeot, Guyot's Delage and Knipper's Keeton.
Fourth row—Mason's Mason, Cooper's Stutz, Thomas' Delage, Anderson's Stutz and Dawson's Marmon.
Fifth row—Freidrich's Bugatti, Goux's Peugeot, Gilhooley's Isotta, Brock's Ray and Burman's Burman.
Sixth row—Rickenbacher's Duesenberg, Disbrow's Burman, Wishart's Mercer, Grant's Sunbeam and Keene's Beaver Bullet.
Seventh row—Haupt's Duesenberg, Boillot's Peugeot and Oldfield's Stutz.

Race Starts Promptly at Ten

Promptly at 10 o'clock the starting bomb exploded and the roaring field was sent away with Carl Fisher setting a 60-mile an hour pace. After the completion of the preliminary lap and when the president of the speedway turned off the track, thirty drivers stepped on as many throttles, the motors' roar became more menacing, the smoke of the exhausts more dense and the fourth annual 500-mile race was on.

Favored by his position in the first row, Howdy Wilcox in the Gray Fox shot over the wire in the lead at the completion of the first lap. The other cars were well bunched and were caught in the following order: Christiaen's Excelsior, Carlson's Maxwell, Tetzlaff's Maxwell, Chassagne's Sunbeam, Bragg's Mercer, Mulford's Mercedes, Goux's Peugeot, Duray's Peugeot, Thomas' Delage, Chandler's Braender, Guyot's Delage, Knipper's Keeton, Dawson's Marmon, Klein's King, Cooper's Stutz, Freidrich's Bugatti, Mason's Mason, Burman's Burman, Wishart's Mercer, Grant's Sunbeam, Gilhooley's Isotta, Boillot's Peugeot, Rickenbacher's Duesenberg, Disbrow's Burman, Keene's Beaver Bullet, Haupt's Duesenberg and Oldfield's Stutz.

At the completion of the second lap the Gray Fox had dropped back to fourth place and Christiaens was leading with the Maxwells 300 yards behind him. On the next circuit of the track Wishart moved up to second place but the Mercer did not challenge the pacemaker for long as Goux could not restrain his natural impetuosity and had brought the Peugeot up within 200 yards of the leading Belgian at the 10-mile mark.

Ray First Car Eliminated

One car, Brock's Ray, was eliminated before the first 20 miles had been covered, being docked with a broken cam on its fifth lap. Christiaens looked to have a world of speed on his first four circuits of the oval and there was a cry of surprise from the stands when it was announced that Barney Oldfield had come out from the ruck and was leading at the end of 20 miles. Christiaens, however, passed the Stutz and was in front at the completion of 40 miles. When this stage of the race was reached misfortune had laid its hand on another entry, Chassagne's Sunbeam blowing a tire on the turn, dishing a wooden wheel and turning over. The idol of Brooklands was not seriously hurt, although he was escorted by Gaston Morris to the hospital tent, where a few beauty patches were applied to some cuts on his face.

A coming event cast its shadow before it when 60 miles had been covered, Rene Thomas and the Delage hurtling to the front at this stage of the struggle. The predestined victor's time for the twenty-four laps was 38 minutes 52 seconds, an average speed of 83.6 miles per hour. The tiny Peugeot, however, was a most persistent challenger and trailed but 19 seconds behind the pacemaker.

Tiny Peugeot Passes Delage

In the next 20 miles Duray not only overtook Thomas but passed the Delage and went to the front to play the role of a mechanical David and humiliate the trailing Goliaths of speed for thirty-two circuits of the track. With the small Peugeot setting the pace, Guyot in the No. 10 Delage took upon himself the task of clinging to Duray, Thomas dropping back to seventh place when he stopped at the pits for the first time to change a tire. This stop did not prove costly, however. Thomas gradually crept up on the Peugeot and although he did not pass it until the two hundred and fortieth mile was turned was always in a dangerous position. Duray completed 100 miles in 1 hour, 10 minutes, 46 seconds, an average speed of 85 miles an hour.

Teddy Tetzlaff joined Ray and Chassagne as spectators after completing thirty-eight laps, a broken rocker arm eliminating his Maxwell just before it had completed one-fifth of the strenuous journey over the slippery bricks.

Disaster strode out on the track soon after the first 100 miles of the race had been covered. An accident on the turn, resulting from the blowing of a tire and the overturning of the Isotta, not only eliminated the Italian entry but wrecked Daw-

son's Marmon and forced Gil Anderson to retire the No. 24 Stutz with a broken crankshaft. Of the six participants in the crash only Anderson and his mechanician escaped without injury. Bob Burman also retired the No. 17 Burman at this stage of the race with a broken connecting rod but continued his chase of the haughty Frenchmen in the Keeton, relieving Billy Knipper, the regular driver.

Guyot Shoots to the Front

After holding the lead for over 80 miles, Duray dropped back in favor of Guyot, who passed the diminutive Peugeot shortly before the 180-mile mark was reached. The Delage driver covered this distance in 2 hours 7 minutes 20 seconds. Duray proved as persistent a challenger as he had been a pacemaker and in the next eight circuits of the track overtook Guyot and led at the completion of 200 miles.

Before the 200 miles had been covered three more American cars had been eliminated. Mason retired the Mason with a broken piston on the sixty-sixth lap, a valve went through the piston and crankcase of the Gray Fox and forced Wilcox to abandon the race, and Chandler docked the Braender Bulldog with a broken connecting rod after covering sixty-nine laps.

At the end of 220 miles Guyot again had passed Duray but he soon lost the commanding position when forced to stop at the pits and the small blue car was leading the field once more when 240 miles had been covered. Another American contender was eliminated while Guyot and Duray were playing Alphonse and Gaston and alternating in setting the pace, Klein abandoning the King on the eighty-seventh lap with a broken valve.

Georgas Boillot, favorite in the betting, experienced more than his share of tire trouble in the early stages of the race but by desperate driving and great bursts of speed gradually worked up from the position of trailer to challenger and at the end of 240 miles was in fourth place and gaining steadily on the small Peugeot and the two Delages.

Thomas Leads at 250 Miles

Thomas was again in front when the race was half over with Boillot only a few seconds behind. They had a 1-lap lead on Wishart and Duray, while two laps behind were Bragg and Guyot, running in fifth and sixth positions respectively.

At 260 miles Duray was leading the field with Wishart second, Boillot third, Thomas fourth and Bragg fifth, the driver of the small Peugeot passing both Boillot and Thomas when both were forced to stop at the pits for tire changes.

For the first time in the race since Oldfield led at the 20-mile mark, an American car was in front when Wishart completed 280 miles. The Mercer had very few seconds to spare, however, with Boillot giving desperate pursuit and gaining at every revolution of his car's wheels. Wishart's time for the 280 miles was 3 hours, 24 minutes, 4 seconds and Boillot was trailing but 24 seconds behind the yellow pacemaker.

Thomas and the Delage were also in a commanding position and by a sensational burst of speed succeeded in sweeping to the front and taking the Prest-O-Lite trophy offered to the leader at 300 miles. Wishart was second and Boillot third at this stage of the race. Two more American cars had been eliminated, Bragg's Mercer with a broken driveshaft magneto on the one hundred and seventeenth lap, and Cooper's Stutz with a broken wheel on the one hundred and nineteenth lap.

The terrific speed demanded by Wishart of the Mercer was costly. A broken camshaft forced him to abandon the race on the one hundred and twenty-fourth lap and left Boillot on the track alone to give battle to the persistent Delage. Boillot was destined to meet the same fate as Wishart after he had wrested the lead from Thomas at the completion of 340 miles. The Peugeot blew a tire on the far turn and the grand prix victor, in conquering his plunging car, broke a frame member that forced him to retire to the seclusion of his pit, from where he watched the futile attempts of his teammate Goux to overtake the despised Delages.

Just before Boillot retired in disgust two American cars were docked permanently. Disbrow retired the No. 1 Burman with broken connecting rods and Freidrich, the lone German representative, abandoned the Bugatti with a broken ball bearing on the driving pinion

Delage Romps Home

With Boillot eliminated, Rene Thomas had the race as good as won. After going into the lead at the completion of 360 miles he was never challenged or overtaken. In the remaining 140 miles of his record-breaking flight he increased his lead over Duray's Peugeot from 1 minute, 22 seconds to 6 minutes and 19 seconds.

At the 480-mile mark Guyot passed the small Peugeot and went into second place but held this position for only 16 laps before he was forced to bow before the speed of Duray's diminutive mount.

For the last 100 miles of the race Goux was firmly entrenched in fourth place. Oldfield, more than 4 minutes behind the 500-mile race winner of 1913, was powerless to overtake the blue car, although he drove desperately and was not forced to stop.

DAWSON EXPECTED TO RECOVER

Indianapolis, Ind., June 3—Special telegram—The latest reports from the hospital where Joe Dawson is being cared for are to the effect that the Marmon driver who was injured in Saturday's race has a good chance of ultimately recovering, although right now he is fighting for his life. His rugged constitution and the fact that he neither drinks nor smokes are greatly in his favor. He passed a rather bad night last night, but this morning the doctors were optimistic and declared they think he will pull through

TABLE SHOWING HOW THE POSITIONS OF THE CARS SHIFTED DURING RACE

Car No.	Car and Driver	MILES																							
		20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	500
16	Delage, Thomas	6	6	1	7	6	3	7	5	3	2	3	2	4	4	1	1	2	1	1	1	1	1	1	1	1
14	Peugeot, Duray	13	9	5	1	1	1	1	1	2	1	2	1	1	3	8	3	3	2	2	3	3	2	2	2	2
10	Delage, Guyot	9	3	6	4	2	2	2	2	1	10	1	9	7	6	4	4	4	4	3	2	2	3	3	3	3
6	Peugeot, Goux	26	4	18	14	9	7	6	7	5	4	4	5	9	9	7	6	5	5	4	4	4	4	4	4	4
3	Stutz, Oldfield	1	19	12	11	12	10	11	8	7	7	6	10	8	8	5	5	6	6	5	5	5	5	5	5	5
9	Excelsior, Christiaens	4	1	2	2	3	5	4	3	6	5	5	7	10	10	6	7	7	7	6	6	6	6	6	6	6
27	Sunbeam, Grant	22	15	21	23	21	17	15	14	13	14	8	13	12	12	10	8	8	8	7	7	7	7	7	7	7
5	Beaver Bullet, Keene	3	21	17	19	18	16	19	15	14	13	11	12	13	13	9	9	9	9	8	8	5	8	8	8	8
25	Maxwell, Carlson	24	25	26	26	26	23	22	20	17	19	16	17	16	16	14	14	14	13	12	11	11	10	10	10	9
42	Dusenberg, Rickenbacher	20	23	16	10	8	11	10	12	11	11	7	11	11	11	12	11	12	12	11	9	9	9	9	9	10
23	Mercedes, Mulford	16	24	15	17	14	15	14	13	18	17	15	16	15	15	11	12	11	11	9	12	12	12	11	11	11
43	Dusenberg, Haupt	2	4	10	27	27	21	21	22	20	20	18	19	19	19	17	15	15	14	13	13	13	13	12	12	12
31	Keeton, Knipper	21	16	11	12	17	14	16	17	16	16	14	14	14	14	13	10	10	10	10	10	10	11	13	13	13
7	Peugeot, Boillot	7	12	19	15	13	13	12	10	10	9	10	4	3	2	3	2	1	3	Out,	lap 1	48,	brok	en fr	ame	M'er
34	Bugatti, Friedrich	28	26	25	24	25	22	23	21	19	18	19	18	17	17	15	13	13	Out,	lap 1	34,	brok	en b	all b	earin	g.
1	Burman, Disbrow	8	11	9	9	10	9	9	9	15	15	17	15	18	18	16	16	Out,	brok	en	valv	ct				
19	Mercer, Wishart	11	8	7	5	4	4	3	6	4	3	9	3	2	1	2	Out,	lap 1	24,	brok	en c	ams	haft.			
2	Stutz, Cooper	15	22	20	18	15	12	13	11	9	8	12	6	5	5	Out,	brok	en w	heel.							
21	Mercer, Bragg	5	2	3	3	5	6	5	4	8	6	13	8	6	7	Out,	lap 1	17,	brok	en m	agne	to dr	ive s	haft		
15	King, Klein	17	18	23	21	22	18	17	15	12	12	Out,	lap 8	7, br	oken	val	ve.									
38	Braender, Chandler	25	20	22	20	23	19	20	18	Out,	lap 6	9, br	oken	con	necti	ng r	od.									
4	Gray Fox, Wilcox	14	10	14	13	11	8	8	19	Out,	val	ve w	ent t	hrou	gh p	iston	and	cra	nk c	ase.						
13	Mason, Mason	27	28	27	25	24	20	18	20	Out,	lap 6	6, br	oken	pist	on.											
26	Marmon, Dawson	12	5	4	6	7	Out,	lap 4	6, tu	rned	over	.														
17	Burman, Burman	19	27	24	22	19	Out,	lap 4	7, br	oken	con	nect	ing r	od.												
24	Stutz, Anderson	10	7	8	8	16	Out,	lap 4	2, br	oken	cran	k sh	aft.													
49	Isotta, Gilhooly	23	17	13	16	20	Out,	turn	ed o	ver.																
8	Maxwell, Tetzlaff	29	29	28	29	Out,	lap 3	8, br	oken	roc	ker	arm.														
12	Sunbeam, Chassagne	18	13	Out,	lap 2	0, tu	rned	over	.																	
48	Ray, Brock	Out,	lap	5, br	oken	cam	.																			

SCENE AT THE NORTH END OF THE PITS

Barney Oldfield stops for gasoline near the finish. The white-uniformed Stutz pitmen are seen working in the cloud of white smoke

The 500-Mile Race as Seen from the Repair Pits

Seven Leaders Did Not Lift Hood During Event—Troubles of the Cars

By Darwin S. Hatch

INDIANAPOLIS, Ind., May 30—It is at the pits that a great race is won or lost. The story of the tortoise and the hare is re-enacted a dozen times at every speedway race. Today's 500-mile event was no exception to the rule. It was not by amazing speeds alone that those cars and drivers which were crowned speed kings after the finish of today's 500-mile grind won their laurels. It was as much by virtue of the stamina and freedom from mechanical difficulties of the cars which permitted them to keep on running lap after lap without making frequent stops at the pits.

There is a lesson in the fact that the first seven cars to cross the finish line never lifted the hood during the race and that all the others that tardily completed the 500-miles had been held up by the need of some mechanical adjustment or replacement.

Delage Boast Is Proven

It has been the boast of the Delage team that never in the racing history of Delage cars has a hood been lifted or a tool used between start and finish, nor was this good record changed today. Duray's Peugeot and Goux's Peugeot both finished the race without unbuckling the strap that held down the bonnet. Not a tool touched the tiny Peugeot and Goux's car was submitted to this indignity but once, when it was necessary to put a new bolt in a front spring hanger. Oldfield's Stutz shares in the honor of the foreign cars and is the only American car to finish which does share in the honor of not having been touched except for tires and supplies. Christiaens' Excelsior and Harry Grant's Sunbeam also came through with a clean score so far as mechanical work on the car is concerned.

Speedy Tire Changes

Pit work in general was not particularly fast, although where tires and fuel supplies caused the stop, great speed was shown. When mechanical difficulties was the cause of the stop the work was done with more deliberateness. The Stutz team holds the record for fast tire changes. The Stutz pitmen changed a tire and filled gasoline and oil tanks in a record time of 25 seconds on Anderson's machine. Burman and Carlson divide honors for the shortest stop at the pits, Burman relieving Knipper in the Keeton with a halt of only 17 seconds, while Carlson in the Maxwell switched mechanics in 18 seconds. Duray took on water in 23 seconds. Some of the other fast tire changes were the following: Goux, 30 seconds; Keene, 42 seconds; Thomas, 50 seconds; Carlson, 55 seconds; Rickenbacher filled his oil tank and changed a tire in 37 seconds. Harry Grant's pit work was noticeably slow. At one time it took 3 minutes and 30 seconds to change a tire. Grant, by the way, had demountable steel wheels and luckily did not have to change but six tires.

Prize for Fast Work

Work at the pits was more interesting than usual this year on account of the competition for the Waltham efficiency trophy which was put up for the car, among the first three to finish, that spent the least time at the pits. Thomas' Delage won this prize as well as most of the others. He made but three halts at the pits, the time consumed totalling only 4 minutes 55 seconds.

The Peugeot driven by Duray, which won second, also was the runner up for the Waltham efficiency prize. The tiny Peugeot made only three stops at the pits, and was held up for a total time of 5 minutes and 27 seconds. Guyot's Delage halted only twice, but as one of the stops was for over 8 minutes it brought the total time out up to 9 minutes 15 seconds. As these were the three first cars to finish, they were the only ones considered in the awarding of the efficiency trophy.

Barney Oldfield's Stutz made the best record of any of the cars to finish. Oldfield stopped only three times and lost only

GOUX STOPS TO REPLACE A BOLT IN THE FRONT SPRING HANGER

The winner of last year's race is seen with knee bent in front of his mount with his mechanician at his left. F. E. Edwards, chairman of the technical committee, is standing by to see that none but driver or mechanic work on the car

3 minutes 36 seconds. Christiaen's Excelsior halted only twice at the pits but lost 6 minutes 17 seconds in doing so, as he was running in sixth, seventh and eighth places throughout the race, with Grant close at his heels, the time lost was quite valuable to the Belgian.

Tires Cause Most Stops

By far the greatest number of pit stops among those to finish were due to blown-out tires. Thomas changed five tires during the race. Duray in the little Peugeot changed an equal number. Guyot's Delage was a little more lucky, wearing out only two casings during the entire 500 miles. Oldfield changed but three during the five centuries, and made those changes in what is considered record time. Christiaens changed four of his casings in the two stops he made. His pitwork was slower than that of most of the contenders.

Thomas ran 140 miles before he made his first stop; then he rolled into the pits and changed both rear tires, being held 1½ minutes. An hour later, after he had run 215 miles, he came in and changed a left rear, getting away in 50 seconds. His last stop during the race was at the end of the 350th mile, when he stopped for fresh supply of gasoline water and oil, taking the opportunity at the same time to change both right tires. This held him 2 minutes 25 seconds at the pits. He ran the remaining 150 miles without a halt. He holds that it will be impossible to make any better speed for some time on account of tires.

Duray did not find it necessary to stop until he had run 170 miles. After this two hours of continuous circling of the brick oval he halted to change the right rear and the right front tire and also fill up the gasoline tank. This caused a delay of 2 minutes 6 seconds. An hour later he stopped for water, but was away again in 23 seconds. Another two hours and he came in for the last time for gasoline and oil. At the same time he changed both rear tires and the front one. Duray did not rely on speed so much, although he had it to spare, as he did on freedom from lost time at the pits.

190 Miles Without a Stop

The first of Guyot's stops came at 2 hours and 16 minutes after the start, during which time he had covered 190 miles. He changed two tires and filled up his gasoline and oil tanks. The motor was hard to start and quite a little time was lost in getting under way after he was ready to go. Eight minutes 20 seconds elapsed before he was on the track again. After completing his 376th mile, Guyot halted for 55 seconds to take on gasoline. The remaining 125 miles of the race were completed without a halt.

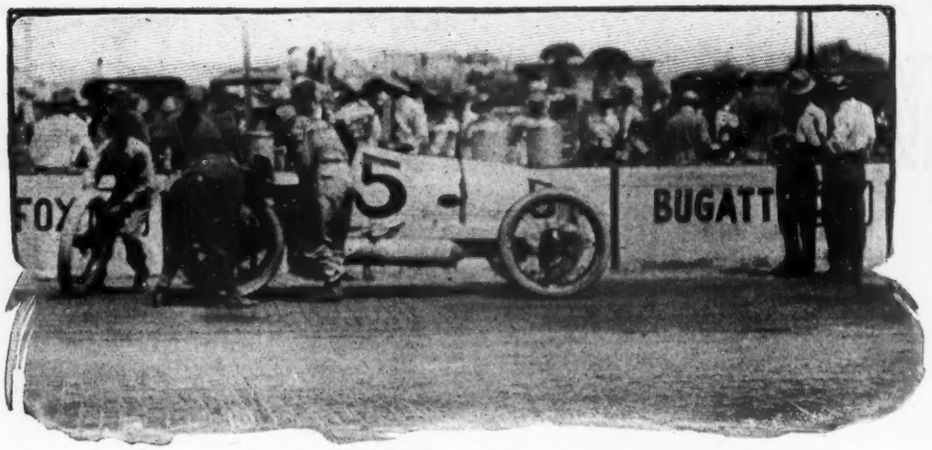
Goux Had Much Tire Trouble

Goux's Peugeot had a great deal of tire trouble. The Frenchman made ten stops in all, and all but one of them were occasioned by tire changes. He put on eleven new tires during the 500 miles. His first tire trouble occurred only 11 minutes after the start, when he had to change the right front wheel but got away in 44 seconds. Twenty minutes later he was in again, rolling down to the pits with the cords from the tread wrapped around the brake band. He changed both rear tires this time and was stopped for 1 minute 31 seconds. After this, he ran a full hour without difficulties, but then came in for replacement on the right rear wheel. He filled up his gasoline tank at the same time, using up 2 precious minutes. Twenty minutes later the new tire blew out and he made the change this time in 29 seconds. This tire lasted 40 minutes, then it had to be

TABLE OF EQUIPMENT USED BY THE THIRTEEN CARS THAT FINISHED

No.	Driver and Car	EQUIPMENT		Plugs	Wheels	Shock Absorbers	Tires	Oil	Other Equipment
		Carbureter	Magneto						
16	Thomas, Delage	Claudel	2 Bosch	Eyquem	R. W	T-Hartford	Cord	Castor	Motometer.
14	Duray, Peugeot	Claudel	Mea	Bosch	R. W	T-Hartford	Cord	Castor	Motometer.
10	Guyot, Delage	Claudel	2 Bosch	Bosch	R. W	T-Hartford	Cord	Castor.	Motometer.
6	Goux, Peugeot	Zenith	Bosch	Oleo	R. W	T-Hartford	Cord	Castor.	Motometer.
3	Oldfield, Stutz	Schebler	Bosch	Bosch	Wood	T-Hartford	Firestone	Monogram & Dixons	Motometer.
9	Christiaens, Excelsior	2 Claudel	Bosch	Bosch	Adex	T-Hartford	Cord	Castor	
27	Grant, Sunbeam	Schebler	Bosch	Bosch	Steel	T-Hartford	Cord	Castor & Dixons.	
5	Keene, Beaver Bullet	Rayfield	Bosch	Bosch	Dunlop	T-Hartford	#	Monogram & Dixons	Motometer.
25	Carlson, Maxwell	‡Harroun	Bosch	Bosch	Houk	T-Hartford	¶	Polarine & Dixons	
42	Rickenbacher, Duesenberg	Schebler	Bosch	Bosch	R. W	T-Hartford	Michelin	Oilsum & Dixons	Motometer.
23	Mulford, Mercedes	Rayfield	Bosch	Bosch	Dunlop	Mercedes	Braender	Oilsum & Dixons	Motometer.
43	Haupt, Duesenberg	Schebler	Bosch	*	Wood	T-Hartford	†	Oilsum & Dixons	Motometer.
31	Knipper, Keeton	Rayfield	Remy	Bosch	Houk	T-Hartford	Nassau	Dixons	

NOTE:—*Champion at Start. Bosch at Finish.
‡Kerosene as fuel.
#Cord, Braender and Miller tires.
¶Dayton, Miller and Nassau tires.
†Riverside at start, Nassau, Riverside and Michelin at finish.



KEENE MAKES A RAPID TIRE CHANGE ON HIS BEAVER BULLET

Fifty seconds is not an unusual time for a car to be halted at the pit for a tire change. With the demountable wire wheels, the entire wheel is changed

changed, occasioning a stop of 1 minute. Thirty-eight minutes later he was in again. This time, also, he changed the right rear tire. He took occasion to refill his gasoline tank during this stop.

Instead of spring bolts at the front end of his forward springs, Goux had a tie-rod passing through both frame horns. This worked loose at one end and was almost dragging on the ground. He made only two laps after his last stop when he had to come in and replace this with bolts. This took up 4 minutes. Fifteen minutes later he was in again for 48 seconds to make another change on the right rear. This time he had better luck, for he ran 1 hour 20 minutes without a halt and made up the most of the time lost during his previous frequent stops. His last stop was when he had only two more laps to go. This was occasioned by a bad tire on the front wheel and he made a record tire change in 30 seconds. This speed was appreciated by the grand stands as it was a critical moment.

Oldfield Never Lifts Hood

Barney Oldfield ran an hour and a half before he had to make a halt. This was occasioned by a right rear tire blowing out, and at the same time he filled up his gasoline and oil tanks. He got away in 1 minute 7 seconds. One hour 40 minutes later he halted again to change a right front tire at the same time he took on oil and gas and gave up the wheel to Anderson. Anderson drove for 1 hour 10 minutes steadily and then came into the pits for a new right rear tire, and gasoline and oil. Oldfield took the wheel and the car was under way in 49 seconds, running steadily to the finish. The hood on the Stutz was not lifted during the race.

Christiaen's two stops were both of greater duration than the average. He did not halt in the steady grind around the brick oval until he had traveled 3 hours and had covered 240 miles. He changed both rear tires and one front one and took on gasoline and oil. He did not get away until 4 minutes 39 seconds had elapsed. An hour and 45 minutes later Christiaens pulled up at the pits, seemingly more for a rest than for any other reason. He seemed completely exhausted and fell out of the car. He stayed at the pits for 1 minute 15 seconds while his gasoline tank was being filled.

A moment's rest seemed to do wonders for him as he took the wheel briskly and finished the remaining 125 miles in good condition.

Grant Loses 9 Minutes

Harry Grant stopped his Sunbeam five times, during which he lost a total of 9 minutes 27 seconds. He changed six tires and took on gasoline once. He ran only 36 minutes before coming into the pit for 1 minute 50 seconds to change a right front. Twenty-four minutes later he was in again to change both right tires, halting for 1 minute 56 seconds. He then continued steadily for 1 hour 6 minutes without a halt, when he stopped to change a right rear tire and also take on gasoline. This caused a wait of 3 minutes 20 seconds. After this he ran for 2 hours 15 minutes without a halt, when a left front tire caused a stop at the pits for 4 minutes 45 seconds. Thirty minutes later he was in again to change the right rear tire and was on the way in 1 minute 47 seconds.

Keene's Beaver Bullet had more than its share of tire trouble. The car made twelve stops at the pits and lost 23 minutes and 28 seconds. Thirteen tires were changed by Keene during the 500 miles and seven of these were on the right rear wheel. He took on gasoline four times and oil once. One other stop was occasioned by work on the spark plug.

Carlson Races on Kerosene

A driver whose running was watched with particular interest was Carlson in the Maxwell. The interest was due to the fact that Carlson ran on kerosene. The only fuel carried in the Maxwell during the race was kerosene, except for a small half-pint priming can of gasoline which was used in starting. Carlson made ten stops at the pits, all but two of which were necessitated by tire trouble. The other two were caused by a change of mechanics and plug replacements. Carlson changed nine tires, took on 12 gallons of kerosene. His ten stops lost him 18 minutes 13 seconds.

Duesenberg No. 42 piloted by Rickenbacher made nineteen stops during the 500 miles. Rickenbacher changed only four tires. The most of his stops were due to engine trouble. He lost a great deal of time in trying to start the engine after each stop, as four or five men usually had to take turns at the crank before the engine would start. A great deal of his engine trouble was with his plugs, but there was not nearly as much time spent on work as there was in getting the motor started. For instance, his last stop was occasioned by a change on the left rear tire and he was all ready to go in about 40 seconds, but it took 7 minutes to get the engine started and four men to crank. He lost, in all, 36 minutes at the pits.

Mulford in his Mercedes Special made seven stops all together, changing six tires. The most serious loss of time was occasioned by breaking the driving chain on the home stretch just above the judges stand. Mulford walked down to his pit, got a new chain, went back and put it on, losing 14 minutes in the process. He lost 13 minutes 50 seconds another time in repairing a broken oil pipe which had been leaking for some time.

Willie Haupt in the Duesenberg made fifteen stops before he finished. The first four were to take on water, as were a number of the others. Every time the radiator cap was taken off the steam and hot water spouted out like a geyser. The engine seemed to be heating up more than the other Duesenberg; the clutch was slip-

CARS ELIMINATED—DISTANCE RUN AND CAUSE

Car No.	Approximate Distance	Cause
7	380 miles	Blew tire, skidded, broke frame
34	360 miles	Broke ball bearing on driving pinion
1	340 miles	Broke valve
19	320 miles	Broke camshaft
2	300 miles	Blew tire and smashed wheel
21	300 miles	Broke magneto drive shaft
15	220 miles	Broke valve—thought it was connecting rod
38	180 miles	Broke connecting rod
4	180 miles	Valve through piston and crankcase
13	180 miles	Caved in piston head
26	120 miles	Turned over
17	120 miles	Broken connecting rod
24	120 miles	Broken crankshaft
49	120 miles	Turned over
12	80 miles	Turned over
48	10 miles	Broken cam

ping; the pump was not working properly. Five different times new spark plugs were put in the motor. It seemed that the high compression caused them to break. Nine tires were changed during the race. The clutch was not disengaged on stopping—seemingly it had been wedged to prevent slipping—and the rear wheels were jacked up on starting. When the engine got going at a good speed, the car was pushed off the jacks and started out on high.

Knipper's Keeton, which was the last car to finish, made thirteen pit stops, changing seven tires. Burman took the wheel of the Keeton after his car had been eliminated and drove for a while, giving place to Knipper and again taking the driver's seat near the finish. Valve trouble occasioned a considerable loss of time near the end of the race. Knipper and Burman, took it to be ignition trouble and put in a new coil, later finding a stuck valve was the trouble. The car had a very complicated spark control connection which ran from one side of the engine around the front to the magneto on the other side. Some of these connections loosened up and this caused trouble for a time. "Mercedes Fritz," Knipper's mechanic got after it with his Speednut wrench which he carried throughout the race and is very proud of the speed with which the repair was made.

He also distinguished himself by slopping water all over the magneto when filling the radiator, causing a failure to start until the two distributers had been wiped out.

Those Who Fell by the Wayside

Of the cars eliminated from one cause or another during the race, Boillot's Peugeot ran the longest and was in third place and gaining rapidly when the accident occurred which put it out. Boillot was leading at 360 miles, but a tire change let Thomas and Duray pass him.

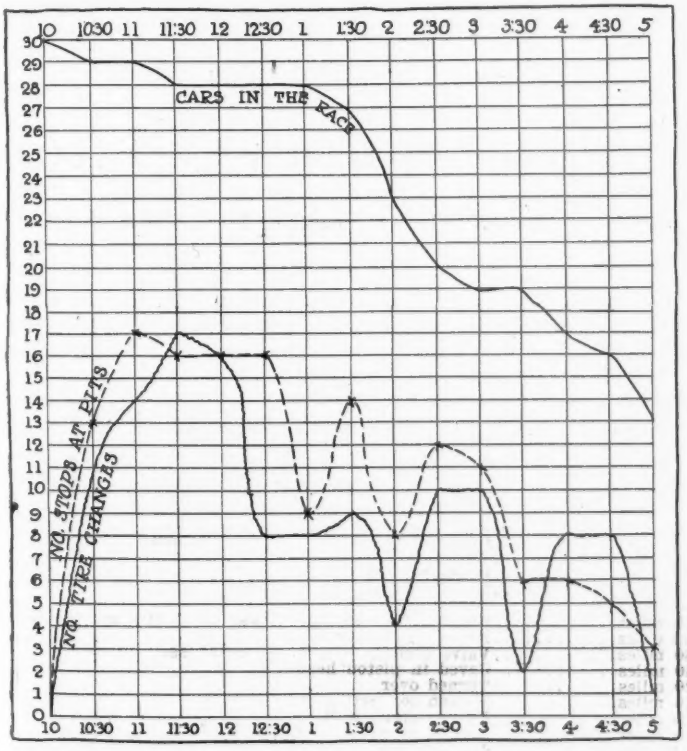
ONE OF BUGATTI'S STOPS AT THE PITS FOR TIRES

Freiderich wore out fourteen casings while he was in the running

A Vindictive Casing

It was while traveling at very high speed in the effort to regain the lost leadership that he blew another tire on a turn. The tire flew up and hit him on the arm, causing him to lose control of the car for a moment. Not satisfied with this, the casing again struck him, this time on the head. The sharp twist that the plucky driver gave the steering wheel caused such a quick change in direction at this high speed that a side frame member was cracked, putting Boillot out of the race.

During more than 370 miles in which Boillot was a contender he made five stops at the pit, all but one of which were for tires. He changed five tires and his pit men made rapid time in the changes, 40 seconds for one tire and 1 minute 2 seconds for two can be considered pretty fast work. During one of the stops for tires he took on 10 gallons of gasoline and at another time took on 15 gallons more.



PIT STOPS AND TIRE CHANGES AS TOLD BY CHART

At each half-hour interval are shown the number of cars on the track, stops at the pits and tires changed during preceding half-hour

Is Unlucky

The Bugatti, which had been expected to make quite a showing for consistent running, was quite unfortunate. Before this car was eliminated after running almost 360 miles it had made fourteen stops at the pits, or one every 23 miles on the average. Tire trouble was the jinx that followed the German. Freiderich changed fourteen tires, getting an average of less than 25 miles to a tire. Most of these were on the right rear wheel, as most usually is the case at the speedway.

In addition to the tire trouble the Bugatti had a little difficulty in its oiling system, and stopped once for work on that. In all, this car lost 34 minutes and 34 seconds at the pits. It finally was definitely put out of the race when one of the ball bearings of the driving pinion gave way. At this time the Bugatti was running in thirteenth place and losing ground steadily.

Louis Disbrow's new Burman car completed almost 340 miles before it was put out of the running with a broken connecting rod. During the time it was in the race it made only four stops and changed only one tire. Nevertheless nearly 54 minutes were lost at the pits, most of which was due to trouble with Burman's new valve-operating mechanism. This car, like its mate, had just been completed in time for a week's practice and the valve operating design was a new and untried one, consequently a certain amount of tinkering was necessary. Valves, springs, and cotter pins were changed and spark plugs were renewed. Disbrow was in sixteenth place when eliminated.

Wishart made only three stops before he pulled up to the pits and announced he was out of the running, with a broken camshaft gear. He had put almost 320 miles behind him and looked like a winner. He was in first place at 280 miles and was running in second place when he went out. He changed only three tires and was detained at the pits for a total period of just over 3 minutes.

Cooper Changes Two Tires

Cooper's Stutz No. 2 accomplished nearly 300 miles of the necessary 500 before a tire blew out, throwing the car into the soft ground of the infield and smashing the wheel. Cooper was not driving at the time, but neither his relief nor the mechanic were injured. Cooper stopped only twice within the run, both times for tires, and changed only two tires. He lost only 2 minutes and 10 seconds altogether making tire changes and taking on oil in 1 minute. Cooper was in fifth place at his finish.

Caley Bragg in the Mercer 21 also covered nearly 300 miles before being elimin-

ated with a broken magneto drive shaft. Bragg made only three stops and changed only one tire, but lost 6½ minutes altogether on account of repairs to his oil tank, which had sprung a leak and was losing oil at a great rate. Bragg attempted temporary repairs with a can of shellac, but that did not seem particularly successful. He was running in seventh place when eliminated.

Case of Bad Judgment

Klien's King had covered nearly 220 miles when it was withdrawn. It is generally thought that Klien's withdrawal was unnecessary, for when the engine commenced to go bad the driver diagnosed the difficulty as a broken camshaft. Later it was discovered that it was simply a broken valve, which would have meant only a delay of a few minutes while a new one was installed. Klein stopped only twice, the first time for 30 seconds when he took on water, and the second time for 1½ minutes while the tire was changed.

Braender's Bulldog, piloted by Chandler, ran its entire distance of almost 180 miles with but one stop before it was eliminated by a broken connecting rod. This stop was occasioned by a change of spark plug and held Chandler less than 2 minutes. Chandler did not change a tire during the 180 miles. He rode on Braender tires, the same make those with which Mulford last year finished the 500 miles without a change.

Wilcox's Gray Fox completed almost the same distance as the Bulldog before it was eliminated. Wilcox's withdrawal was caused by a valve dropping into the cylinder and going through both the piston and the crankcase. He only made one stop and that was to replace the broken push rod. Wilcox, likewise, did not change a tire. His tires were Silvertown cords.

Mason, driving his namesake, was eliminated at about 175 miles with a caved-in piston head. He made four stops at the pits, losing 4 minutes and 46 seconds and changing two tires.

Joe Dawson, in the Marmon, had run only 120 miles without a stop of any sort when his accident put him out of the running. He was in seventh place at the time. Burman, in his own car, No. 17, made only one stop before he was eliminated after having run nearly 120 miles. His halt at the pits of 4 minutes and 50 seconds was to change four spark plugs. He changed no tires. His withdrawal from the race was occasioned by a broken crankshaft.

Anderson's Stutz was eliminated on account of a broken crankshaft after it ran almost 120 miles. Anderson's one stop at the pits, at which time he took on gasoline and oil and changed a tire, held him only 25 seconds, which is the record for fast pit work.

Gilhooly stopped only once and that time he was flagged down by Assistant Starter DeLong for a warning as to his method of driving. This detained him 3 minutes. A few minutes later his Isotta turned over and was the cause of Dawson's accident. The Isotta had gone a little over 100 miles.

Chassagne's Sunbeam never stopped from the time it started until the upset after having gone just under 80 miles. The Ray had negotiated under 10 miles when it went out with a broken cam.

DEFENDERS OF FRANCE'S RACING HONORS

Following the finish of the big race there was a jubilee held in front of the pits, participated in by Thomas, Duray and Bradley, all of whom came over from Europe in the same steamer. In the illustration Duray, runner-up, is shown at the left, shaking hands with the winner, Thomas, while in the center is W. F. Bradley, Motor Age's European correspondent and manager of the Delage team

Tires a Determining Factor

Casings Destroyed Represented Investment of $14,000

INDIANAPOLIS, Ind., May 30—Tires were the determining factor in today's 500-mile race. The terrific speed over the hot bricks of the 2½-mile oval destroyed the casings in rapid succession and the smell of burning rubber was ever present around the track. The winner, Thomas, says that he does not believe that the record he set up will be broken for some time because tires cannot stand a faster pace.

Over $14,000 was burned up in tires alone during the race. One hundred and thirty-eight casings were ground to shreds or blown into the air during the five-century motoring marathon and each of these specially constructed racing tires cost over $100 on the average. Of the cars which succeeded in finishing the race Guyot's Delage had the least tire trouble, only two tires having to be replaced during the 500-mile drive. These were cord tires.

Oldfield's Stutz had next to the least tire trouble, having to replace only three casings. Oldfield finished fifth and the Stutz was the first American car to finish. Firestone tires were used throughout the race by Oldfield.

Christiaens' six-cylinder Excelsior wore out only four of the cord tires with which the car was fitted. Rickenbacher's Dusenberg has a life record for the Michelin tires. The winning Delage and the tiny Peugeot each used up five cord tires and Grant's Sunbeam used six, as did Mulford's Mercedes Special. The Beaver Bullet holds the record among the finishers for the greatest number of tires changed, having lost thirteen.

Goux, who finished fourth, claims a record almost as bad, with eleven tire changes. The little Bugatti, although it did not finish, wore out the greatest number of

tires of any car to start. It used up fourteen in 360 miles.

Unusual Tire Sizes and Pressure

Some rather unusual tire sizes and tire inflation pressures were developed by the drivers for the special conditions of the 500-mile race on the speedway. Burman, who used 35 by 5-inch tires all around, carried 90 pounds pressure on the right or outer tires, and 85 pounds on those next to the pole. This was on the double assumption that as the right tires had further to go, they needed a little more pressure, and also the difference in pressure makes a slight difference in tire diameter, which would save wear on the turns.

Wilcox carried from 70 to 80 pounds in his Silverton cords and Keene, in the Beaver Bullet, carried 75 pounds. Goux and Boillot had 34 by 4½-inch tires in front, and 35 by 6-inch in the rear. The latter are a somewhat unusual size. They carried 80 pounds in front and 85 pounds in the rear.

The Delages carried 4 kilograms per square centimeter and their tires were also of an unusual size, being 35 by 5-inch in front and 35 by 6 in teh rear. The pressure figures out to be about 57 pounds per square inch. Chassagne's Sunbeam used 34 by 4½-inch tires all around, inflated to only 65 pounds.

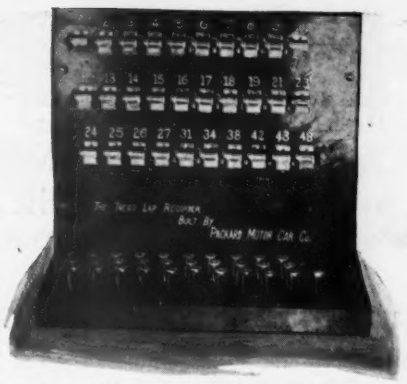
Tire Heat Considered

Mason had 32 by 4-inch tires in front and 34 by 4½-inch in the rear, inflated to 60 pounds only. Duray, with his 32 by 5-inch tires, also an unusual size, carried between 60 and 65 pounds. Carlson, in the Maxwell, carried only 40 pounds pressure with tires 32 by 4½ in front and 33 by 5 inches in the rear. This was the lowest pressure used, and Harroun's selection of this possibly was based on his experience in last summer's transcontinental trip, in which he used 34 by 6-inch tires inflated to only 30 pounds pressure. Judging from the results of observations at the pits it would seem that the lower tire pressures give somewhat longer life to the tires in this high-speed work, particularly when tires of rather large cross-section are used in the race.

The reason for the lower pressures giving better results, if they do, is due to the fact that there is an enormous increase in pressure as the tire heats up. It is figured that a tire inflated to 85 pounds cold will have 106 pounds pressure in it when it gets warm and when it gets hot enough to burn rubber, as often was the case on the track, the pressure within the casing must be enormous. At least it often was sufficient to cause the tire to explode.

PIT STOPS AND TIRE CHANGES

Car No.	No. Stops	Time at Pit Min. Sec.	No. Tire Changed
16	3	4—55	5
14	3	5—27	5
10	2	9—15	2
6	10	12—23	11
3	3	3—36	3
9	2	6—17	4
27	5	9—27	6
5	12	23—28	13
25	10	18—13	9
42	9	—36	4
23	7	42—27	6
43	15	42—54	9
31	13	47—58	8
1	4	54—	1
2	2	2—10	2
4	1	4—	0
8	4	23—44	7
13	4	14—46	2
15	2	2—	1
17	1	4—50	0
19	3	3—8	3
21	3	6—29	1
34	14	34—24	14
24	1	0—25	1
38	1	1—56	0
48	..	Out	0
49	1	3—0	0
7	5	4—36	5



INSTRUMENT KEPT TRACK OF THE CARS

Trego lap recorder, the invention of Frank H. Trego, which registers the number of laps each car has made every time it crosses the tape. It is a series of automatic counters, one for each car, operated by typewriter keys. When a car crosses the wire the key bearing its number is pressed and the register shows one more lap for it

As an instance of how carefully the drivers calculate on tire pressure and how closely they watch it, Haupt had his tires pumped to three different pressures, 65 pounds on the right rear tire, 80 pounds on the left rear tire and 75 pounds on the two front tires.

Dollar-eighty for Fuel

Carlson had a unique record in that not a drop of gasoline was used in the Maxwell during the race. The fuel he used was kerosene of 43.3 degrees Baume gravity, which sells at about 6 cents a gallon. He used just a little less than 30 gallons, in the 500 miles, which gives him a consumption of 16.7 miles per gallon. Gasoline was used to start the engine before the race, but none during the race. After finishing, Carlson stopped at the pits for rest and congratulations for 15 minutes, and then started on coal oil. One blown-out spark plug was the only trouble experienced.

COLE GIVES RACE DINNER

Indianapolis, Ind., May 30—One of the functions connected with the 500-mile race is the annual Cole dinner the night before the international contest. President J. J. Cole, of the Cole Motor Car Co., was the host last night to the representatives of the press and the dinner at the Claypool hotel was a gathering of newspaper and tradepaper men from all over the country.

Wilbur D. Nesbit acted as toastmaster and arranged the program so that the dinner was under way at 7 o'clock and adjourned at 9.

BARNEY OLDFIELD, TIRED BUT HAPPY

It must have been most gratifying to the former speed king to add to his racing laurels by being the first American to finish in the 500-mile race. Also Barney gained distinction by having led the scramble at one time. Oldfield and his Stutz were prominent at all stages of the race

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The Small-Car Victory

ALTHOUGH the Delage car driven by Thomas finished first in the 500-mile speedway classic last Saturday and is entitled to every jot and tittle of honor that goes with such an international victory, yet America and Europe unofficially will look upon the performance of the little Peugeot which finished second, 7 minutes back of the winner, as the most epoch-making feature of the race in that the tiny Peugeot is fitted with a motor with a piston displacement of but 183 cubic inches, its cylinders measuring 3.07 by 6.14 inches. Heretofore America has heard of the amazing speed performances of the small motor but never before have Americans been privileged to witness what is known as the 3-liter car—183 cubic inches piston displacement—perform on American tracks. After Saturday's performance the possibilities of the 3-liter car have been demonstrated in America, more than 100,000 people having seen such a car travel 500 miles only to be beaten by one car.

RECENTLY France demonstrated in one of its 3000-mile touring contests, open to 183-cubic inch cars, that these little creations can average 20 miles per hour for days and weeks through the mountain sections of France, during this reliability contest, with all of the parts sealed. Timed hill-climb contests were carried out in which the small car showed its prowess and at the final completion of the trials a 67-mile road race with touring bodies and fenders showed the winner capable of maintaining a sustained speed of over 58 miles for 1 hour. What more can be asked of any car, and what more by way of speed, hill-climbing ability and reliability could be asked for?

FRANCE has been practically compelled to bring out high-speed efficiency motors, due to government tax, high price of fuel and the economical qualities of many French buyers, who cannot see any necessity for a motor of 600-cubic inches or even 450 cubic inches when a car with a motor of but 183 cubic inches will give the last word in speed and reliability, coupled with the desired economy that is possible with them. It is quite true that the racing Peugeot that took second place at Indianapolis uses a different motor than that used in the stock Peugeot so far as valve arrangements and many other details are concerned, but the standard touring car uses the same motor size and seems to give all that the fastidious French buyer demands.

THAT the race is not always to the biggest motors has been demonstrated since the opening days of the big speedway races and this year the winning Delage that averaged 82.47 miles per hour has a motor with but 380.2 cubic inches piston displacement, although allowed to use one with 450 cubic inches under the rules. All four of the first cars to finish were under 400 cubic inches, a fact which will insure high speeds in future races even if the piston displacement is cut to 350 cubic inches.

TIRES played a large part in Saturday's race, introducing as they did a new aspect into track racing in that cord tires were used in quantities for the first time. The cord tire uses either large or fine cords placed diagonally instead of using woven fabric. These tires have been partly responsible for the higher speeds of the race, due to the construction of the tire which is more efficient in speed and also in fuel economy. A feature of the cord tire is that it is almost proof against blowout, although there were one or two examples of blowout in the race, a defect in the tire construction being more or less responsible for the situation. The cord tire was used in much larger sizes than ever before, there being several 36 by 6-inch tires fitted on the rear, and these with air pressures of 70 pounds or under, instead of pressures of 90 or 100 pounds used in the same size of fabric tire. With the cord tire high speeds are possible with large sizes, a contradiction of the general view that too large tires reduce the speed.

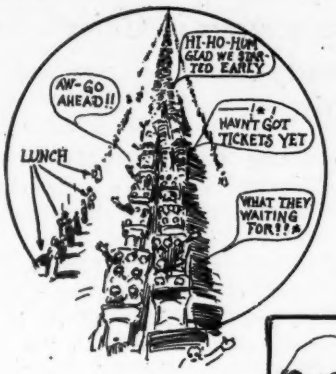
THE Indianapolis speedway should in its outline of rules for next year include an anti-smoke ordinance in the racing cars. Practically all of the foreign machines made the entire race without emitting a single cloud of smoke, whereas some entries practically made it dangerous at the pits and going into some of the turns because of the clouds of smoke that issued through the exhaust. The race of Saturday demonstrated that a car, in fact, several cars, can average over 80 miles per hour for 500 miles without smoking, a condition due to care in the oiling system. Not a single one of these cars used a splash oiling system, but the majority rather employed pressure systems to the bearings with drilled crankshafts and leaving the oil mist to care for the wrist pins and cylinder walls. The object is not to feed too much oil but only enough when needed and to the place needed. Some of the cars started out with 2 gallons capacity in the crankcase pump and a reserve of 1.5 gallons and did not take any on during the entire race. Castor oil was a greater factor than ever before, and this in spite of the ruling made by the speedway that it would be barred, which ruling had soon to be withdrawn.

THE American cars made a poor showing, getting only one place out of the first seven finishers, although taking the last three places, eight, nine and ten, in the money. Not a single one of the foreign cars was eliminated due to mechanical troubles, excepting in the case of two accidents, following the bursting of tires, the violent skid breaking a wheel in one place and bursting a wheel in the other.

THE race was remarkably free from several troubles that have been more or less in the public eye in other years. For the first time there was not one case of magneto trouble from start to finish, and very few spark plugs were changed as compared with former years. Several of the drivers experienced trouble with plugs in practice, but they had these all solved before the start arrived.

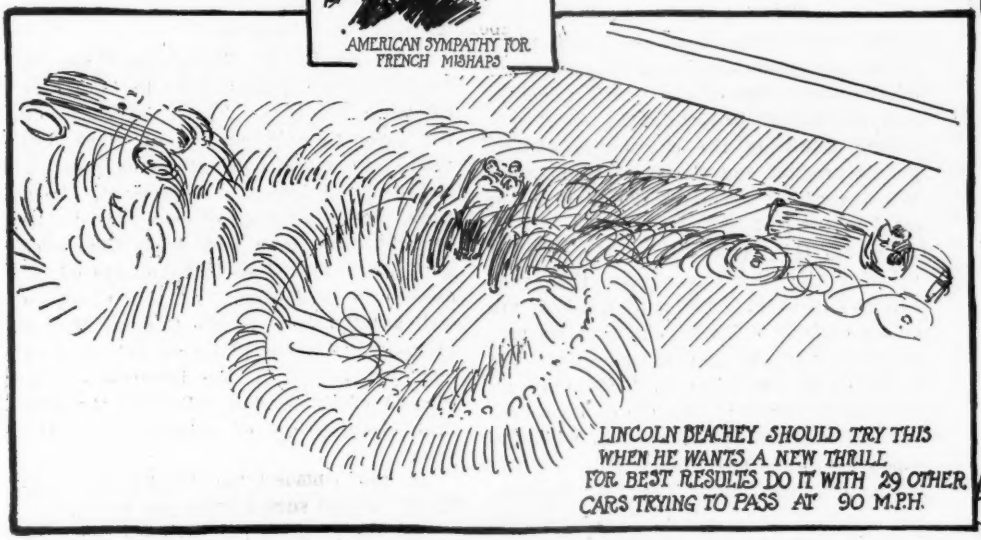
LOOKING towards next year's race, it is a foregone certainty that the foreign machines will be here in greater numbers than ever before, and also it is an accepted fact that unless American builders get started early on their special racing machines, they will not have any brighter chances than during the present race. There is not such a thing as twelfth-hour success in racing; you must get your cars built months in advance and you must have them well worked out 3 months before the date of the race. Waiting to the last week or so to solve questions of gear ratio, make of carbureter to use, make of magneto to use, kind of oil to use, etc., are certain rules to failure. With such a program the car is not ready, and the drivers are poorly prepared for the fray.

The Indianapolis Race as Cartoonist Wilder Saw It



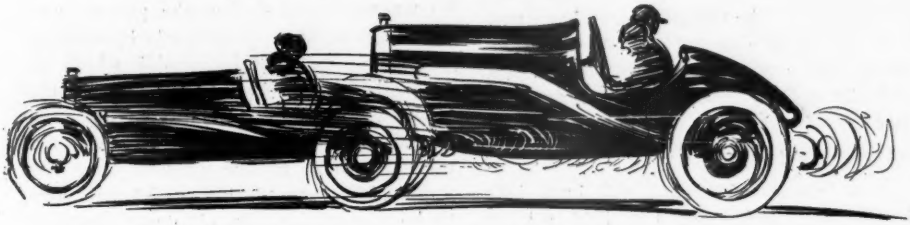
AMERICAN SYMPATHY FOR FRENCH MISHAPS

THE CAR WITH THE BROKEN STOVEPIPE

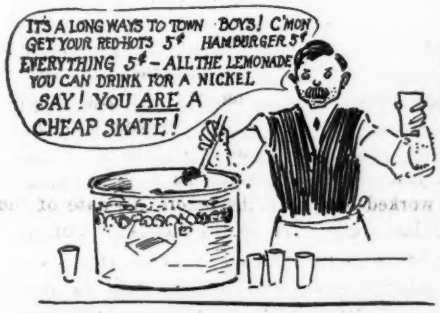


LINCOLN BEACHEY SHOULD TRY THIS WHEN HE WANTS A NEW THRILL FOR BEST RESULTS DO IT WITH 29 OTHER CARS TRYING TO PASS AT 90 M.P.H.

TINY PEUGLOT TAKES THE CANDY AWAY FROM NURSIE



WATCHFUL WAITING ON THE BRIDGE



AFTER THE RACE

THE ENTHUSIASTIC AMERICAN WHO REMEMBERS THAT ALL HIS BETS ARE ON THE FRENCH DRIVERS

Sun of Prosperity Shines All Over State of Michigan

Optimism Is Paramount Among Motor Car and Accessory Manufacturers in Cities Outside of Detroit—Most of Season's Output Has Already Been Disposed of and Factories Are Working Full Shift

By L. V. Spencer

DETROIT, MICH., June 1—Healthy condition of factories in general is the keynote of reports gathered from a comprehensive trip to several of the principal cities outside of Detroit, but still close enough to be a part of the motor car industry's storm center. A brighter outlook for the coming season than has been the rule for several years past seems to be the consensus of opinion of nearly every factory head interviewed, and to one who has been in comparatively close touch with the general feeling for a number of years past, this is borne out by facts.

Plenty of Business

Nearly every factory has succeeded in disposing of all or nearly all of its product and if there has been any slump in some of the months past, it has been fully made up for by the greater impetus of the warmer summer days and general awakening of the buying public to the fact that despite the outcome of the Mexican war, the tariff and the banking laws, they must have cars and really can afford to have them. There seems to be plenty of money for motor cars, but the public held on to it later this year, letting go all at once, so to speak.

Jackson, Mich., for instance, where there are several large interests devoted to the motor car, is evidence of a very successful 1914 season. The payrolls here are considerably increased as compared with the corresponding period 1 year ago. This is distributed over all of the plants, and is an indication of extremely healthy conditions, for the payroll is the first part of the factory to feel a slump.

Lansing, Flint and Pontiac, each of which boasts several well-known plants, are all in the best of spirits over the outlook, and reflect on a smaller scale the general favorable condition as found in the center of the industry—Detroit. Everywhere, optimism is paramount.

The Buick Motor Co., Flint, Mich., has completed the most successful year in its history. This company, which is one of the largest producers of low and medium-priced cars, manufactures in its own plant nearly every part of its vehicles. Due to the weeding out of unnecessary operations and the elimination of all waste working force, the Buick company has been able to give a better car for the money than ever before and this is largely responsible for the exceedingly good year. This efficiency of manufacture thus proves to be one of the greatest factors of success in the motor car industry as well as in any other industry.

The Buick company expects to materially increase its production schedule for 1915 and the new models will be on the market in August. The Buick market is all over the United States, there being no section which can be said to predominate in the consumption of the car. The Buick company also enjoys a good foreign business, but the number of cars shipped out of the United States as compared with the total number of cars built is not very large, because the Buick company has always had a good demand at home and has not pushed its foreign trade.

The working force at the Buick plant is reduced somewhat just now on account of the completion of the year's schedule, and the lay-off is simply the usual procedure following the completion of one year's product and the start on another. When working normally the plant gives employment to 5,500 men.

Besides this large output of passenger vehicles the Buick company this year turned out about 1,000 trucks, which are on an entirely different chassis than passenger cars. At the present time the truck department has to build only an exceedingly small percentage of its schedule and it still has 2 months in which to do it, viz., June and July.

The Oakland Motor Car Co., Pontiac, will complete and sell every car it has built by July 1, although the fiscal year for this concern, as with all other General Motors properties, does not close until August 1. The Oakland sixes have met with a strong demand and there is no doubt that a greater proportion of them could have been marketed had they been produced.

Oakland Making 7500 Cars

In all about 7,500 cars will have left the Oakland shops for the 1914 selling year. At this time the Oakland company is figuring on a very large increase in output, but does not care to say just exactly what this increase will be. The new models are expected to be submitted to the public on August 1.

The Oakland company did not attempt any foreign business until this year, although up to this time the concern has been sending a few of its cars abroad. But this year branches have been opened in London, South America and Australia and considerable success has met this entry into the foreign trade. The Oakland company has a good general trade all over the United States although, due to the fact that its output is not of very great volume, it has not gone in for general distribution in the smaller towns and cities, confining its representation to the larger cities and depending upon these larger cities to take care of the surrounding territories.

The Weston-Mott company, Flint, Mich., a parts-making concern, is closing a very successful year, the volume of its business being greater than ever in the history of the concern. Not only does this Weston-Mott company supply axles, rims and hubs to car manufacturers in the General Motors group, of which it is a part, but it also does a big business with outside concerns.

Weston-Mott Prosperity

Increases in all departments are in vogue for the coming year to take care of more business. These increases do not refer to enlargements of plant, but rather to more efficient manufacturing methods and increased equipment. In a word, manufacturing efficiency is to be brought down to a finer basis than ever and this is looked to to take care of increases in production. At this plant, as well as all others, in the General Motors group, there seems to be no reduction of employes except in the interests of increased efficiency and following the natural cleaning up of schedules for the year.

At the Olds Motor Works, Lansing, Mich., where Oldsmobiles are made, the production of sixes for the year has been entirely completed and that proportion of the four-cylinder cars which was to be manufactured during the present year will be completed on schedule by July 31. The new four-cylinder model which recently has been added to the line has met with big success in all parts of the country where Olds has representation and makes it look at the present time like some 7,500 cars of this model will have to be turned out. In all departments of the Olds plant they are figuring on greatly increasing the efficiency of production in order to take care of increased output without crowding.

Oldsmobile distribution is well taken care of in nearly all parts of the United States by well-run branches and dealers. Little foreign business is done, principally because the concern can find ample market in the United States for nearly all cars which it produces. However, the Olds concern has a number of good representatives abroad and his cars are meeting with general satisfaction in Europe, where used. It is likely that foreign business will be sought after this year, probably more strenuously than in past years, although it is hard to tell just what the policy will be in this respect.

W. A. Paterson, head of the W. A. Paterson Co., Flint, Mich., long established in the vehicle business, and for a number of years identified with the motor car business, states that this branch is one-third better at this time than it was a year ago and is well satisfied with the outlook. The Paterson company is practically through with its 1914 schedule and is really working at this time on the 1915 product, which is expected to be on the market about June 15. Mr. Paterson is very sanguine as to the future and believes that if there has been any slump in the business, that time is past. Like many other concerns, the Paterson company may have felt the temporary slowing up of business, but the greater impetus given it when things did open it, has more than offset the dull period.

Most Paterson cars find their market in the west, although general distribution is enjoyed. California, with Los Angeles as the base, is a good market, while Kansas City and Des Moines are also bright spots. Active pushing of these cars in these territories is most marked and reflects the good representation there. Ohio and Michigan are of course very good territories, many Paterson cars finding a market close at home.

Mr. Paterson sees no cause for complaint and thinks business in an exceedingly healthy condition.

The General Motors Truck Co. finds the truck business a great deal better than it has been and conditions are improving steadily. In fact, the concern is breaking its production record this month and considering the whole year has sold more trucks than ever before in its history.

Truck Business Good

Naturally the outlook for the future is very bright and extensive increases in production are planned. These can easily be taken care of, a 50 per cent increase in volume of business being possible in this Pontiac plant. J. C. Trumbull, assistant secretary, states that the prospects are brighter than they have ever been since the company entered the truck business. On January 1 of this year the prices were reduced and this one factor alone has of course been a great impetus to selling. The General Motors Truck Co. does not build on a schedule extending very far ahead, but rather plans its production from month to month in accordance with the orders it has on its books.

The concern builds both gasoline and electric trucks and it is stated that the demand for both types is about the same, although there is a little stronger sentiment in favor of the gasoline type just at this time. The concern can give no reason for this especially, but states that the demand varies, sometimes being stronger for one type and sometimes for the other.

General Motors trucks find a market all over the country. In fact, orders shown the representative of Motor Age were some of them widely separated. New York and San Francisco markets seem equally active. Orders for trucks from Peru and Australia in particular seem quite numerous. The foreign business in trucks, however, is not pushed for the reason that the American market will take practically the entire output without trouble.

Report from Cartercar

Relative to business conditions as pertaining to the Cartercar Co., Pontiac, Mich., H. R. Radford, general manager, states that while it is an accepted fact that general business is not exactly what could be desired, he sees nothing to worry about in connection with the motor car business. Mr. Radford says further that according to his observation every factory manufacturing a good car is experiencing no trouble in disposing of its product and many of them are building a good many more cars this year than last.

The Cartercar production is about 25 per cent greater this year than last, and Mr. Radford points out that his company has not enough cars to supply the demand, nor has it had for the past 60 days. Sales of Cartercars for March and April and up to the present time this month not only equalled but exceeded a similar period of any previous year by nearly 50 per cent.

The Champion Ignition Co., Flint, Mich., one of the General Motors group and devoted exclusively to the manufacture of spark plugs, had a very good year. This concern supplies many outside companies with its product as well as General Motors companies, and since nearly all of its customers have been exceedingly prosperous its business has fared correspondingly well.

The Champion Ignition Co. manufactures spark plugs complete in every detail and has perhaps one of the most efficient plants in its line of business. Every feature of production has been figured to its highest efficiency basis and this policy, along with the solid selling force, is responsible for a large output from a comparatively small plant.

The Imperial Automobile Co. is operating a night shift in order to supply the demand for its four and six-cylinder cars. Orders are now coming in from all sections as freely as in past seasons, with possibly the exception of small portions of the extreme southwest, where sales have been somewhat curtailed owing more to the unusual weather conditions during the past few months than to any financial disturbance.

Both models of Imperial sixes are selling heavily, especially in the larger cities like Boston, New York, Chicago and St. Louis, while the bulk of the four-cylinder car trade comes from the middle west, which has always been the best field for Imperials.

Generally speaking the Imperial company finds the trade very gratifying in all sections save the extreme south, and has reasons to think that its domestic, as well as foreign trade for the season of 1914 will be equal to if not greater than that of last year. While the demand seems to be toward a more moderate-priced car, still sales have been heavy on Imperial sixes at $2,000 and $2,500, which seems to the Imperial company to be indisputable evidence that the six is going to be the coming car. Especially will this be true if a large number of light sixes are put on the market at a price around $1,600, it is pointed out.

While it is a little early to make a complete forecast for the season of 1915, the best indications are at this time that a great many more motor cars will be built in America next year than in any past year. Accordingly, Imperial has already begun to plan for a 50 per cent increase in its production for 1915. This will be governed largely by final crop conditions for this season, which now seem to be far above the average.

Speaking generally for all sections over which Imperial solicits trade, the prospects are for the remaining weeks of 1914 and the year 1915 much better for heavy sales than they have been for years past, the concern states.

Jackson Has Fine Year

Howard A. Matthews, Jr., sales manager of the Jackson Automobile Co., Jackson, Mich., reports that his concern has had the biggest year since 1909, orders holding up in fine shape. In fact, there are more unfilled on the concern's books than is usual at this time of the year. In an ordinary year the commencing of a shut-off in demand can usually be seen about this time, but the Jackson company at present see no disposition to such a letting up of demand.

The Jackson company, according to Mr. Matthews, is operating several of its departments night and day. These are usually the machine shop and body departments, although occasion often demands to work other departments overtime to keep up with production. In all, about 2,500 cars will be produced for the 1914 season, mostly of the four-cylinder type, the sixes being in small proportion. It is pointed out that the Jackson company did not market a small six this year and this may perhaps have some bearing on the fact that the four-cylinder output was much greater.

Distribution of Jackson cars is quite general all over the country and there is also some foreign business. To be exact, about 5 per cent of the Jackson cars produced are shipped out of the United States, some going to Australia, South America, South Africa and a few to European points.

In a word, Mr. Matthews says that business is in good shape and there is nothing to worry about.

Production at the Jackson plant has been

increased during the past season to keep pace with the requirements of the selling organization, but even with the larger output the company has been unable to fill orders which have been coming in during the past 4 months. Trade has been well up to the average in the east and in the larger cities of the middle west, and the demand has exceeded all expectations.

The Jackson factory was more than 500 cars behind its orders on May 15. New orders are coming in almost as fast as shipments are being made and it is probable that June 15 will find the factory still with a substantial shipping schedule ahead.

Olympic Best Seller

The Olympic 40 four-cylinder model at $1,385 has been the greatest seller in the Jackson line, although there has been a steady demand for the larger four-cylinder model at $1,885 and an increasing sale on the six-cylinder Sultanic at $2,300. The distribution of the larger models does not appear to be limited to the larger cities, as might be expected. The western farmers are taking their share of the higher priced cars. On the whole the 1914 trade has been most satisfactory and the outlook for future business has never been better.

Murray Irwin, sales manager of the Lewis Spring and Axle Co., Jackson, did not feel that his concern could at this time furnish any substantial information relative to conditions, although business is in the best of shape. Due to a radical change in product he preferred not to go into details. He stated, however, his belief that conditions for the coming year are exceptionally bright and that the season is finishing in very strong shape.

J. D. Dort, president of the Durant-Dort Carriage Co., Flint, Mich., states that there is quite a keen demand at this time in the motor-wagon department of the concern for both its 1,000 and 1,250-pound truck and its 1,600 to 2,000-pound model. This demand is very healthy at this time.

Great Demand for Reos

The Reo Motor Car Co., Lansing, Mich., anticipates that the demand for the Reo next year will be far in excess of that experienced this season, which in itself has greatly exceeded the supply. The concern is now 2,500 cars behind on orders, even though production this year has averaged sixty cars a day, which is considerably more than the concern has ever produced in the past. The Reo production for 1913 season was 7,813 cars, while for this year the schedule will be 13,000, or an increase of nearly 50 per cent.

In discussing the conditions, H. M. Lee, assistant sales manager, says that the Reo company knows very little about any depressions in business in general. If such exists, the Reo company does not feel it, he states. "Such a depression should very materially affect our truck business, while the fact is it is growing rapidly and far exceeds business done by us at this period last year," says Mr. Lee.

Reo Selling Many Trucks

Shipments of model J Reo 2-ton trucks in May last year totalled thirty-six, while this year from May 1 to 21 the company has shipped sixty-one such trucks and is in the neighborhood of seventy orders behind on delivery, all of them being specified for immediate shipment. In commenting on this condition, Mr. Lee says, "We do not know of a stronger argument we can cite to evidence the prospects of the motor car business, and the Reo business in particular."

C. F. Rueschaw, sales manager of the Reo company, has been in the far west for the last 3 weeks. His object in making the trip is to size up the situation, and he has found all along the line that prospects never were brighter. Mr. Rueschaw further reports that excellent conditions exist on the coast and he looks for a business from that section for 1915 that will exceed that which his company experienced this year. Although the motor car business in California has not been quite up to par this year, still Reo sales there have been increased quite largely and the prospects for the immediate future are very bright.

Maxwell Enjoys Good Year

The Maxwell Motor Co. has enjoyed a very successful year. The 1914 production is entirely disposed of, and plans are now under way for the turning out of about 60,000 cars for the coming year. Additional machinery and equipment will have to be added, and several new buildings may be erected in Detroit on some of the property which the concern owns adjoining its present plants in the city. This expansion will mean the employment of several thousand more men, it is stated.

"We are feeling particularly jubilant over the outlook," said President Walter E. Flanders. "The talks that I have had with our district sales managers, with many of our dealers and with our factory managers, and the talks that Mr. Redden, our sales manager, has had with many people in the business, whether representing us directly or indirectly, make me feel that we are entering an era of wonderful activity."

With the shipment of 175 cars on April 30, the Maxwell company broke all past production records for both daily and monthly output. A total of 3,200 cars were shipped in the last 30 days and, as there were only 26 working days in April, an average manufacturing schedule of 123 cars a day was maintained. This is a remarkable showing when it is considered that the Maxwell company did not start shipping from Detroit plants until last July.

Speaking of this, Mr. Flanders says, "Problems facing us were the organization of an entirely new factory staff and the acceleration of production. That we have accomplished both is testified to by last month's output. To have increased manufacturing facilities from half a dozen cars to 175 a day is a record which could only have been made by the hearty coöperation of all departmental heads and the credit for this efficient work should go to them without doubt."

Sales Manager J. V. Hall of the Olds Motor Works, Lansing, Mich., says that the success of the new model 42 Oldsmobile, the little six, is so great that when the publicity campaign is started the first of August, it is anticipated that more orders will be coming in than the Olds Motor Works ever had even in the days of its successful curved dash runabout. The most remarkable side of the matter is that 75 per cent of the dealers have not seen model 42 but have been ordering when they learned that it was an exact reproduction of the big six, only weighing under 2,600 pounds and selling for $1,350.

REPORTS ON POPE AFFAIRS

Hartford, Conn., June 1—Colonel George Pope as receiver of the Pope Mfg. Co. in the Connecticut jurisdiction has filed with the superior court a list of claims against the company and schedules of the amounts allowed and disallowed. The aggregate of claims filed is $1,736,979. Those allowed with interest to May 1 amount to $1,606,912.69. Interest items amount to $53,910.13 while disallowance on claims amounts to $175,592.68. Claims filed after April 22 total $31,427.84.

Among the large disallowances is the claim of E. J. Blake of this city, an aluminum founder, filed as $32,644.02 of which only $635.92 was allowed. The claim of Albert L. Pope for $44,537.71 was disallowed to the extent of $44,330.40, the claim of George Pope for $30,153.22 was disallowed to the extent of $30,000, that of C. E. Walker for $30,153.22 was disallowed to the extent of $30,000 while the claim of W. C. Walker for $26,802.88 was disallowed to the extent of $26,666.68. The largest allowed claim is that of the First National Bank of Boston for $319,839.35. The inventory of the Pope company assets filed in the superior court last December showed the company to have property in this state appraised at $2,034,900.

STATE LIABLE FOR EMPLOYES

Trenton, N. J., May 28—Assistant Attorney-General Boggs, in an opinion to Commissioner of Motor Vehicles Lippincott today, said a chauffeur injured while operating a state motor car might have a claim against the state under the employers' liability act.

"Every employe of the state seems to come within the provisions of the workmen's compensation law," said the assistant attorney-general, "and it might be well in insurance policies to include the liability of the state for accidents to its own employes."

Sioux City 300-Mile Race Next on the Motor Calendar

Hawkeye Event Attracting Many Crack Drivers

SIOUX CITY, Ia., June 2—The 300-mile race on the local 2-mile track is the next big thing of the motor calendar now that the Indianapolis event has become a matter of history and there is every reason to believe that the Hawkeye contest will rank among the classics.

Already sixteen entries have been booked for the Fourth of July race and there is every reason to believe that there will be more than thirty before the lists close. The limit is twenty-seven and it is anticipated that it may be necessary to run eliminating trials just as was done at Indianapolis. The cars that will be shut out will be eligible for a special race that will be run a day or so before the long grind.

The cars that have been entered so far are a representative lot. The Stutz company has nominated two, one to be driven by Oldfield and the other by Anderson. Harry Grant has put in the two Sunbeams, one of which he will drive himself, while the other will be handled by George Babcock. Cyrus Patschke will drive C. E. Erbstein's Marmon in place of Joe Dawson, who was injured at Indianapolis. The list also shows several others who were in the Hoosier event. Keene with the Beaver Bullet and Klein with the King are entered and so is Rickenbacher with the Duesenberg. Ralph Mulford has made an entry. He may drive a Duesenberg and he may be at the wheel of one of the Peugeots, Goux's, provided a certain deal is made.

Brock with the Ray also is in, while two of those who failed to qualify, also have declared—Callahan with the Stafford and Stringer with the Washington, now known as the Stringer Special. In addition there are a Chevrolet to be driven by Jack Lecain, a National with Roy Bauer up, a White, which George Clark may drive, and H. A. Whitmore's Chalmers six.

In addition, entries are expected from the Mercer. Wishart would drive one and there is a likelihood of Earl Cooper taking the other. Carlson and a Maxwell may be here; Joe Horan is counting on sending two Metropols. Burman may make an entry, and Mort Roberts may be here with a car for Guy Thomas, who is dickering for a Delage.

C. A. Kneedler will referee the meet, and the starter will be Fred J. Wagner. The race starts at 11 a. m.

BIG QUAKER SOCIABILITY

Philadelphia, Pa., May 30—Ninety-eight cars, of which all but a dozen finished within the allotted time, took part in the Philadelphia Inquirer roadability run today from Philadelphia to Atlantic City, N. J. So successful was the event that it is believed it will pave the way for numerous events of its kind during the outdoor season. Valuable prizes in cash and plate were the magnet that attracted the largest number of entries in such a run in recent years.

The affair was a secret time schedule one and participants were allowed wide latitude in starting and finishing. The start, which was from the Inquirer building, could be made at any time between 9:30 a. m. and 1:30 p. m., the only stipulation being that cars finish at Atlantic City not later than 5:30 p. m., after which specified time limit no arrival would be recorded. The mayors of Philadelphia, Camden and Atlantic City each selected a time, the three times were added together and divided by three. The result was 3 hours 49 minutes, and the nearness of a number of cars to this figure was out of the ordinary. Only 2 minutes 45 seconds separated the first and tenth prize winners.

R. S. Marsden, of Lansdale, Pa., driving a Pullman, finished in 3 hours 49 minutes 15 seconds, and won first prize, $200. Second prize of $150 was awarded W. H. Gilmour, Maxwell, time 3 hours 49 minutes 30 seconds. Third prize, $100, to Dr. S. Leon Gans, Buick. Fourth prize, $50, A. P. Ryan, Studebaker. Additional prizes of silver cups were awarded the following: William Olliver, Mercer, 3:47:30; W. E. Van Trump, Carnation, 3:51:00; R. A. Erwin, Winton, 3:46:30; Mrs. J. Corduff, Mitchell, 3:46:30; H. A. Porter, Keeton, 3:52; F. A. Paxson, Cadillac, 3:52.

FARMERS FIGHTING MOTORISTS

Camden, N. J., May 31—The antagonism against the motorist of the farmer and other users of horse-drawn equipment has cropped out again, this time in a more virulent form than ever. The touring season is on in full blast and fine roads connect Philadelphia with all the South Jersey coast resorts. Consequently the Jersey roads fairly hum with motor traffic, especially on Saturday and Sunday. When to this is added a holiday like yesterday, the horse is lost. To this abnormal traffic in the last 3 days was added the hundred cars that participated in the Inquirer roadability run on Friday and the Stone Harbor run on Saturday, which drew almost another hundred.

Farmers in New Jersey, especially in Camden county, charge they have been driven off the roads and their lives placed in jeopardy, and have petitioned the New Jersey motor vehicle department to have special inspectors placed along the main arteries between Camden and Atlantic City. Another protest has been lodged that the powerful headlights carried by the rapidly-propelled cars confuse drivers of horse-drawn vehicles and are a direct cause of numerous accidents. Farmers argue that the use of these powerful headlights is prohibited in the cities because they dazzle and confuse pedestrians and insist they be kept off the country roads. Motorists have retorted to the headlight charge by a countercharge that drivers of horse-drawn vehicles are failing to observe the law requiring the carrying of lights at night.

RESULTS AT BENNINGS

Washington, D. C., May 30—Three thousand people today saw a program of eight motor car and four motorcycle races run at Bennings track under the auspices of the National Capital Motorcycle Club. Eddie Hearne was the hero of the day, winning three events in a Case. He also drove an exhibition mile in Disbrow's Jay-Eye-See in 66 seconds. The track, a mile affair, is sandy and a rain during the afternoon made it slow. Summary:

Washington cup, open only to Washington drivers, 5 miles—Donn Moore, Mercer, won; Gardner Orme, Apperson, second; C. Pratt, Washington, third. Time, 6:22⅘.

Three-mile, class E, non-stock, for cars of 450 piston displacement—Fred Horey, Bullet, won; L. Heinemann, Scat, second; Joe Cleary, Tornado, third. Time, 3:40.

Australian pursuit race, 5 miles—John Raimey, Case Comet, won; Fred Horey, Bullet, second. No time taken.

Three-mile novelty race, with wheel change in front of grandstand—Eddie Hearne, Case, won. Time for one-wheel change, 18⅘ seconds.

Free-for-all, 8 miles—Eddie Hearne, Case, won; J. Raimey, Case Comet, second; F. Horey, Bullet, third. Time, 5:39.

Match race, 5 miles—E. French, Chevrolet, won; Frank Stewart, Reo, second; J. E. Crowder, E-M-F, third. Time, 7:16½.

Mile exhibition—Eddie Hearne, Jay-Eye-See. Time, 66 seconds.

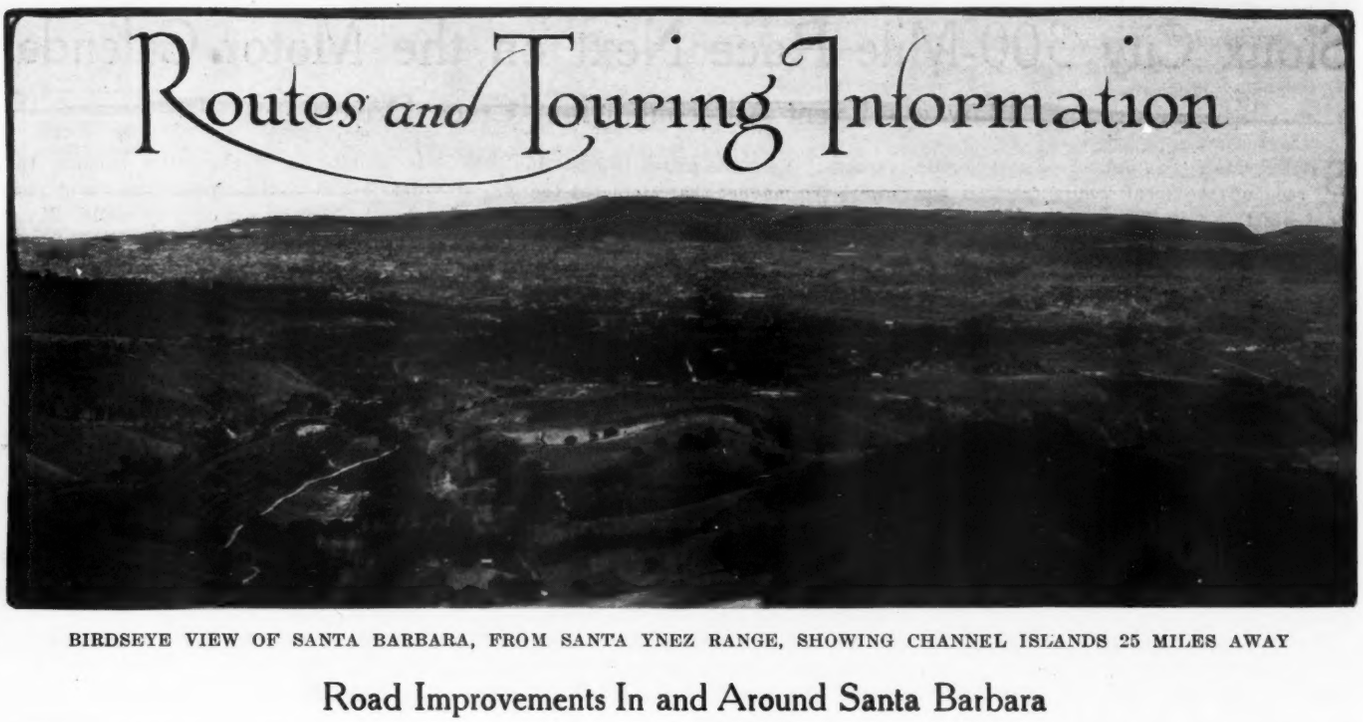
One-mile time trials—J. Raimey, 1:03⅘; L. Heinemann, Scat, 1:06⅘; J. Cleary, 120 h. p. Special, 1:08⅘.

WANT WASHINGTON ON ROUTE

Washington, D. C., June 1—President Woodrow Wilson probably will indorse the movement to have the route of the proposed Lincoln highway pass through Washington. Impressed by arguments put up to him today by a joint delegation of business men from this city and Baltimore, he instructed his visitors to prepare letters to the Lincoln Highway Association, which he might decide to sign, asking that the route be changed so as to include Washington. As the proposed highway is a private enterprise, the government has no direct influence over the selection of the route. The delegation urged that the route be diverted so as to run from Philadelphia, through Wilmington, Baltimore and Washington, and thence by way of Ridgeville road to Frederick, Md., thence to Gettysburg, where main route would be picked up.

It was pointed out to President Wilson that no actual construction would be needed in making a change of the route, inasmuch as the road commissions of Pennsylvania, Delaware and Maryland have practically completed a new and continuous highway passing through all points on the newly suggested route.

Routes and Touring Information



BIRDSEYE VIEW OF SANTA BARBARA, FROM SANTA YNEZ RANGE, SHOWING CHANNEL ISLANDS 25 MILES AWAY

Road Improvements In and Around Santa Barbara

SANTA BARBARA, California, has for some time been on the road map, but is being put more effectively so by the recent action of the county board of supervisors when it decided to finance $400,000 worth of state highway bonds. This method of financing state highway bonds has previously been explained in Motor Age.

The bonds are 4 per cent and not attractive and the buying houses have refused to take them up excepting at about 96. The market varies a little. This means there is a shrinkage of about $60 on every $1,000 worth. The counties make up the difference. The bond houses are allowed this and through the state treasurer purchase the bonds. In the case of Santa Barbara county, the taking up of $400,000 worth of bonds is equivalent to a contribution of $24,000.

When this money has been expended, as it will be this year, there will be a continuous highway from Santa Maria, 100 miles to the north, to Ventura, 30 miles to the south. This will all be part of what is known as the coast road of the state highway.

But that is not all that Santa Barbara will have to offer the tourist that comes within its gates during the great exposition year of 1915. Contiguous to the city are many miles of excellent roads that for exploration purposes offer much more in interest than may be found among the more beaten paths.

Santa Barbara's Attractions

Santa Barbara has a wealth of lore, much of which clusters about the best preserved mission of California, where the altar lights have not been dimmed in more than a century. This imposing edifice has gone through the many changes in California without ever having been molested or swerved from its original purpose. It is true that an electric road has been built by this house of worship during the last year, but as the car whizzes by at eventide, a padre, attired in the saintly robe of the Franciscan order may hurry his cows from the pasture across the road to within the walled estate.

That reminds one he is crossing the road that leads towards the mountains up mission canyon. Passing up this canyon one encounters an irregularity of roads, which there is a slight indication of in the birdseye view of Santa Barbara. It is the irregular variety that so charms the explorer. He never can stray far from home in following any road, but at that he may do considerable straying. The farther he goes, the greater altitudes does he gain, with new views of city and mountains.

Roads Built for Grades

He may approach much that is beautiful in its artificiality, but he always will have close at hand natural beauties that never can be disturbed. The roads towards the mountains have been built for grades. There could be no thought of lines and, therefore, the roads find the easiest grades.

No set of photographs could adequately do justice to this system of roads towards the mountains. They have simply grown, not planned, and they will never be anything but what they are today as to direction and general scheme. They can only be made more permanent.

Location of Santa Barbara

Santa Barbara has eminences to both sides. Just inside the shoreline rises the mesa, the altitude of which varies from 200 to 500 feet, thus completing a valley scheme that has no equal in the world. Between the mountain foothills and the mesa the valley is level and opens to the channel-guarded sea, and swerves to the southward and 15 miles away is so closely crowded by the range that a road has been built on stilts. That is the Rincon, and where causeways have provided the start for a sea-level road to overcome the hazardous road through the Casitas pass. The Rincon is in Ventura county, but as has been repeatedly stated the project of financing the causeways and the state

THE PATH LEADING TO THE OLD MISSION

highway improvement was left largely to Santa Barbara. Work is about to commence on the permanent improvement of the Rincon section of the state highway, the contract having been let.

Along the mesa is an oiled road known as the cliff drive, which leads to beautiful Hope ranch park. This is a tract of land consisting of several hundred acres. There is the Potter Country Club and it has been improved with a system of many miles of macadam roads. One of the finest road sections in the country is the palm boulevard that leads past the country club and out to the main highway.

Road Work in Montecito Section

During the last 5 years a great deal of road work has been done in the fashionable Montecito section, east from Santa Barbara. Much of the effort there as well as in the country was due to the untiring efforts of the late Louis Jones, president of the chamber of commerce. Mr. Jones was among the few who assumed the great burden of raising by private subscriptions $50,000 to build the afore-mentioned Rincon causeways. But that was only part of the public utility effort he engaged in. He acted as the first road inspector on the first permanent paving laid in Montecito.

Mr. Jones and his wife died in the storm of January 25. They were attending a function at the Santa Barbara Country Club, in the Montecito section, and when the storm became more serious their apprehension increased in regard to their children and they started for home. They were compelled to abandon their car where the flood had carried out a section of a cross road and continued along the improved San Ysidro road on foot. No one can tell just what had happened and the first intimation of tragedy was the discovery the following day of their bodies in Little Schoolhouse creek, which by then had subsided.

The small but wealthy congregation, the Episcopal All-Saints-By-the-Sea will memorialize this enthusiast with the Jones chapel, and it is proposed in other ways to perpetuate his name.

One of the first pieces of road work in the Montecito section was the Eucalyptus hill road from Palm drive to the city limits. Now it is proposed to continue the macadam surface from the city limits to connect with the main artery that is being paved through the city. That will come as a gift to the community.

The main artery through the city of Santa Barbara is being done very much in the same manner as arterial streets are being improved in other cities. All property will assist in bearing the burden, but is to be done here in two sections. The east section is nearing completion, and the proceedings for the west section have been started.

WORK FREE ON YELLOWSTONE TRAIL

Fifty thousand men are estimated to have worked May 22 on the 1,150 miles of the Yellowstone park trail between the twin cities and Gardner, Mont. Except for the road through the Standing Rock Indian reservation in Corson county, S. D., by night the entire trail was ready for travel by motor cars and farmers' wagons. Telegrams from along the line to George N. Keniston of Hettinger, N. D., traveling representative of the association, who happened to be in Minneapolis, showed excellent work done. Luncheons were served at noon by the women and in the afternoon there were sports, music, and essays and declamations by school children on good road building. Repairs were made on bridges and culverts, and danger signs were placed at the railroad crossings.

Markers of natural stone were set up or repainted yellow. Stones were raked from the road, grades were restored, side water was drained, gravel was placed on the trail and as much as possible of the route was dragged.

Between Livingston and Gardner, the gate of the motor car prohibited park, 125 men with teams worked the road. On other divisions ten gasoline engines and twenty teams were used for drag work. In North and South Dakota there were seventeen gasoline engine drags at work and in Minnesota road dragging was done. Mr. Keniston said Minnesota has the best dirt roads on the trail and Montana the most miles of improved road.

Some of the work reported follows: North Dakota—Marmarth, 2 miles graded; Rhame, several miles worked; Bowbells, 10 miles with 300 men and two tractors working; Reeder, cut down big hill; Montana—Hundreds of men took the road early in motor cars and even county commissioners donned overalls. The last stretch to the park had the most thorough work. Minnesota—In nearly every trail town business houses were closed and citizens and city and county officials turned out with them to work the roads.

DRIVEWAY TO HOPE RANCH PARK

Answers to Inquiries for Routes

Aledo, Ill.-Sauk City, Wis.

ALEDO, Ill.—What is the best route from Aledo, Ill., to Sauk City, Wis.—H. C. Weisel.

It is 228 miles between the cities mentioned, and on leaving Aledo go directly to Davenport through Taylorville and Milan, then via Pleasant Valley, Princeton, Clinton, Lanark, Freeport, Ill., Monroe, Wis., Oregon, Madison, Ashton, to Sauk City.

Oklahoma, Kansas and Colorado

Walter, Okla.—Editor Motor Age—I would like road directions covering route from Walter, Okla., to Steamboat Springs, Colo., via Hutchinson, Kan.—J. S. Butler.

Go to Lawton, Anadarko, Chickasha to El Reno, thence through Kingfisher, Hennessy, Jefferson and Wellington to Wichita, Kan. To Hutchinson, Kan., it is but 59 miles, through Mt. Hope and Yoder. From Hutchinson take the Santa Fe trail through Sterling, Great Bend, Larned, Dodge City, Garden City, Deerfield, Kendall, Syracuse, Granada, Las Animas, La Junta, Avondale, to Pueblo.

Leaving Pueblo you will have improved roads all the way through Florence to Canon City, thence over one of the most beautiful trips in Colorado, through Cotopaxi and Wellsville Hot Springs to Salida; following a direct road up the Arkansas valley to Buena Vista, thence through Granite, Malta Junction, Leadville, over the Tennessee pass to Pando, Red Cliff, Minturn, and Wolcott; the last lap of the journey being from Wolcott to Steamboat Springs through McCoy, Toponas, and Yampa. Total distance approximately 1,187 miles. Volume 5 of the Blue Book contains complete running directions, and we would not recommend your making the trip through such mountainous regions without complete directions as to road conditions, etc.

Memphis, Tenn.-St. Louis, Mo.

Memphis, Tenn.—Editor Motor Age—I want to take a trip from Memphis to St. Louis about the middle of June.—J. C. Rogers.

Your road to St. Louis is a very poor one

and should be driven with considerable caution. You should cross into Arkansas going west as far as Forest City 49 miles through Mound City, Marion and Madison then turn north Wynne, Whitehall, Harrisburg, Greenfield, Jonesboro, Brookland, Paragould, Marmaduke, Rector, Piggott, St. Francis, Campbell, Dexter, Bloomfield, Aquilla, Allenville and Dutchtown.

From Cape Girardeau to St. Louis is 169 miles and the towns are Jackson, Fruitland, Longtown, Perryville, Ste. Genevieve, New Offenburg, Weingarten, Farmington, Flat River, St. Francois, Bonne Terre, De Sota, Victoria, Hillsboro and Mexville.

We would not advise you to make this trip, although the roads should be at their best at that time.

Dayton, O.-Lawton, Okla.

Dayton, O.—Editor Motor Age—Kindly advise me the best route to Lawton, Okla.—F. F. Bradley.

Follow the National highway to St. Louis, the Santa Fe trail to Wichita and the Meridian road to Lawton.

You will reach St. Louis after running through Eaton, New Hope, Westville, Richmond, Cambridge City, Knightstown, Greenfield, Indianapolis, Plainfield, Belleville, Reelsville, Harmony, Brazil, Terre Haute, Marshall, Martinsville, Casey, Greenup, Jewett, Woodbury, Montrose, Effingham, Dexter, Altemont, Bluff City, Vandalia, Hagerstown, Mulberry, Greenville, Highland, Troy and Collinsville.

Across Missouri it is a 2-day run through Pattonville, St. Charles, Harvester, Dardenne, Wentzville, Wright City, Warrenton, Jonesburg, New Florence, Montgomery, Wellsville, Martinsburg, Mexico, Clark, Renick, Higbee, Yates, Armstrong, Glasgow, Slater, Marshall, Mt. Leonard, Blackburn, Corder, Higginsville, Mayview, Odessa, Oak Grove, Grain Valley, Independence and Centropolis to Kansas City.

Wichita to El Reno is 184 miles through Haysville, Wellington, Mayfield, Caldwell, Renfrow, Medford, Jefferson, Pond Creek, Enid, Waukomis, Dover and Kingfisher. To Lawton it is 114 miles through Minco, Pocasset, Chickasha, Anadarko, Stecker and Apache.

Fort Smith, Ark.-Dallas, Tex.

DeLeon, Tex.—Editor Motor Age—Please give me the best route to Fort Smith, Ark., via Dallas in the next issue.—Old Subscriber.

From Dublin, go to Clifton, then north to Ft. Worth via Meridian, Walnut Springs, Glen Rose, Rainbow, Nemo, Bono and Cleburne. Ft. Worth to Dallas is Handley and Grand Prairie, and on east to Texarkana pass through Richardson, McKinney, Anna, Whitewright, Bonham, Windom, Honey Grove, Petty, Paris, Blossom, Detroit, Clarksville, DeKalb, New Boston and Leary. Texarkana to Hot Springs is 129 miles over natural road which is bad in wet weather through Fulton, Hope, Emmet, Prescott, Boughton, Gurdon, Arkadelphia, Bismarck, and Hot Springs to Little Rock, 54 miles, through Lonesdale, Benton, Collegeville and Old Relay House. It is not an easy trip to Ft. Smith through Conway, Wooster, Plumerville, Morrillton, Atkins, Dardanelle and Paris.

Trinidad, Colo.-Little Rock, Ark.

Hastings, Colo.—Editor Motor Age—I am figuring on a trip from Trinidad to Little Rock, Ark. Kindly give me a routing.—F. Townsend.

With 216 miles between Trinidad and Amarillo your itinerary lies through Des Moines, Granville, Mt. Dora, Clayton, Texline, Ware, Dalhart, Hartley and Channing. Between Amarillo and Ft. Worth 369 miles extends through Claude, Clarendon, Hedley, Memphis, Newline, Estelline, Childress, Kirkland, Quanah, Vernon, Electra, Wichita Falls, Henrietta, Bellvue, Bowie, Sunset, Alvord, Decatur, Newark and Hicks. Dallas is reached through Arlington and Grand Prairie, 33 miles.

To reach Texarkana the routing is 219 miles through Richardson, McKinney, Sherman, Anna, Vadalia, Whitewrit, Bonham, Honey Grove, Petty, Brookston, Paris, Sylvan, Blossom, Starksville, Detroit, Clarksville, Annona, DeKalb, New Boston and Leary. To Hot Springs a natural road, bad in wet weather, extends through Fulton, Emmet, Prescott, Boughton, Gurdon, Arkadelphia, Lindsay and for Little Rock continue 54 miles through Epps, Lonesdale, Fairplay, Benton, Collegeville and Old Relay House.

Mt. Vernon, Ill.-Farmington, Ill.

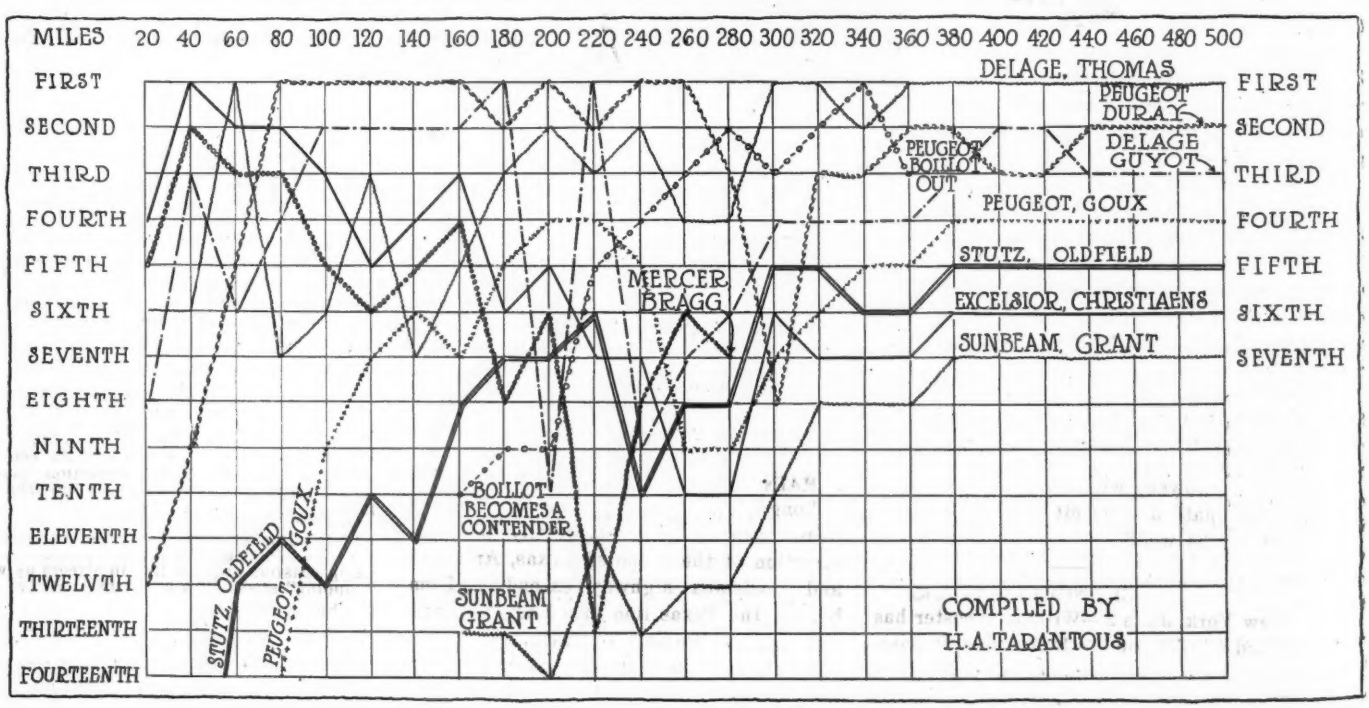
Belle Prairie, Ill.—Editor Motor Age—Please tell me the best route from Mt. Vernon to Farmington.—C. O. Lane.

Go to Sandoval either through Centralia or Salem then through Patoka, Vandalia, Ramsey, Pana, Assumption, Taylorville, Buckhart, Rochester, Springfield. To Peoria it is 69 miles through Middletown, New Holland, Delavan, Dillon, Groveland, and to Farmington through Pleasant Valley, Hanna and Trivoli.

Holds Agent Not Liable

BOSTON, Mass., May 30—An interesting law point as to responsibility in motor accidents was settled by a jury recently in the Massachusetts superior court before Judge Lawson. On July 3, 1913, a motor car owned by William Graustein was going to Hartford with a party. A motor car owned by Mrs. Mildred Smith of Northboro was being driven to Boston to be repaired. There was a collision and members of the Graustein party were injured. Suit was brought by Graustein's party against Mrs. Smith and James W. Maguire, Boston agent for the Pierce-Arrow. The testimony showed that Mrs. Smith had telephoned to Mr. Maguire that her car needed an overhauling. Maguire's foreman answered that Mrs. Smith must send the car to Boston, and it was arranged that an employe of Maguire should go to Northboro and drive the car to the repair shop. This man, Gilson, was at the wheel when the accident occurred. So the suits charged Mrs. Smith and Maguire with being responsible jointly, the former as owner of the car, and the latter because his man was at the wheel. The jury returned a verdict against Mrs. Smith for $8,600, but the suits against Mr. Maguire were thrown out by the jury on the ground that he was not to blame for his employe's act. Graustein sued Mr. Maguire separately for damages to his car. This, too, was thrown out by the jury.

Speed Chart of 500-Mile Sweepstakes at Indianapolis



SHOWING HOW POSITIONS SHIFTED IN THE BIG RACE LAST SATURDAY

San Francisco Picks Dates for Its 1915 Road Races

Four Events Listed by Exposition Management

SAN FRANCISCO, Cal., June 2—Dates for the Vanderbilt cup, grand prize and Panama-Pacific road races, to be run next year in connection with the Panama-Pacific exposition, were announced today by the directors of the 1915 world's fair.

The Vanderbilt cup race will be held on Monday, February 22, the grand prize contenders will be sent away on Sunday, March 7, and on the following Sunday, March 14, the speed carnival will close with the struggle for the Panama-Pacific cup. This latter event probably will be a small-car race. The 2 weeks intervening between the Vanderbilt cup and grand prize races will give the drivers competing in the first event ample time to prepare their cars for the March 14 contest.

In addition to these three classics, it is planned to hold a race from New York to San Francisco, similar to the one between New York and Portland held in connection with the Yukon-Alaska-Pacific exposition.

GERMANY MAY HAVE RACE

Berlin, May 30—A movement has been afoot for some time to promote an international road race in Germany in 1915. Unless unforeseen things happen it is safe to say that either in July or in August of 1915 a stock car race will be held and very likely on the private, specially-built motor boulevard which is nearing completion in the vicinity of Frankfurt.

From information at hand it would appear that there will be a 2-day meet, the first day being reserved for light cars weighing less than 750 kilos, and the second day for cars of over 750 kilos but not more than 1,000 kilos. It is possible that the maximum cylinder capacity will be set at 4.5 liters. Some are in favor of limiting the fuel supply and suggest 20 liters per 100 kilometers. Each of the big cars are to be so constructed that after the race it can be fitted with a touring car body to seat four passengers. The distance for both days' races is to be not less than 700 and not over 1,200 kilometers.

WEDDING BELLS FOR WISHART

Indianapolis, Ind., June 2—Cupid has dropped the checkered flag for Spencer Wishart and wedding bells soon will ring for him. The announcement of the engagement of the Mercer race driver to Miss Louise McGowan was made today by Mrs. Hugh McGowan, widow of the late traction magnate of this city. No announcement of the wedding date has been made.

WOOSTER CHANGES HIS PLANS

New York, June 2—William Wooster has decided to abandon the building of Palmer-Singer cars costing $450. Mr. Wooster will auction off at 10 o'clock on June 8 all of his recent purchase in lots and not in one parcel. He recently purchased the machinery and most of the stock and parts at the bankruptcy sale of the Palmer & Singer Mfg. Co., Long Island City, and stated that he had plans to enter the car manufacturing business, building a small car with a Continental motor and other standard parts at the above price. The name Palmer & Singer was included in his purchase.

WILLYS ADDS TO HOLDINGS

New York, May 30—The Willys-Overland Co., Toledo, O., has acquired the remaining shares of the R. & L. Co., this city, having last November purchased an interest in the company. This purchase, however, did not constitute a controlling interest, both J. T. Rainier and Paul Lineberger remaining the active principals in the business. The present purchase, however, gives the Willys company full control and hereafter the R. & L. Co. will act as a service and operating company exclusively, conducting the service buildings in this city, Newark and Brooklyn. Rainier and Lineberger, who have retired as officers and directors, have formed a co-partnership and will have the sole selling rights for Garford and Willys commercial vehicles in the same territory. The whole R. & L. sales organization has been taken over by them. E. A. Williams, formerly president of the Gramm Motor Truck Co., Lima, O., becomes president of the R. & L. Co.

PREST-O-LITE CO. TO RECALL TANKS

New York, June 2—A plan to recall all its gas tanks has been promulgated by the Prest-O-Lite Co. Following up the advantage given it by the opinion of the United States circuit court of appeals in its suit against the Searchlight Co., it hopes to get all of its own tanks back into its own service system and feels that it can keep them there now by reason of the court's ruling. This ruling was that a refilling company cannot use a Prest-O-Lite tank unless the Prest-O-Lite name and label have been obliterated. The company has sent out letters to dealers in which it threatens suits if tanks are refilled and sold as Prest-O-Lite tanks. Before the decision refillers had been permitted to paste labels over the Prest-O-Lite mark.

RAINS DELAY TEXAS ROAD WORK

Longview, Tex., May 30—The heavy rains have delayed temporarily the construction of the proposed Texas, Arkansas and Louisiana highway extending from beyond the Texas line into Louisiana and Arkansas to Dallas. The return of favorable weather will enable the work of completing the links on the road to proceed rapidly, as practically every district is ready to build its share of the highway. The Caddo parish of Louisiana has built a fine gravel road from Shreveport to Waskom on the state line. Marshall precinct of Harrison county will expend $300,000 on good roads and will build 24 miles of the highway through the county. Gregg county is employing state convicts to build its roads and already has completed an excellent road across the county east and west. Smith county has voted $300,000 of bonds which will be used to build 25 miles of graded road extending from Gregg county on the east to Van Zandt county on the west. Van Zandt county is building its share of the highway through a special road tax and private subscription. Kaufman county, adjoining Dallas county, is preparing to connect the highway with the Dallas pike west of Forney. This highway will afford the most direct motor route from the southeastern section, including Louisiana and Arkansas to the Pacific coast and western points. Below Shreveport and in East Texas there are few passable through roads.

KRIT PAYS ANOTHER DIVIDEND

Detroit, Mich., June 1—An additional dividend of 20 per cent has been paid today to the creditors of the Krit Motor Car Co., of Detroit, which brings the total up to date to 30 per cent. General Manager Crawford reports that business is very good and everything seems to indicate that it will keep up. A statement will be issued by the company during the latter part of the week.

ST. LOUIS TACKLES TRAFFIC CODE

St. Louis, Mo., May 29—The street and traffic committee of the Automobile Club of St. Louis in its report to President Flesh recommended five new ordinances of considerable interest, to regulate foot and vehicle traffic in St. Louis. The advocated ordinances the municipal assembly will be asked to introduce follow:

1—An ordinance prohibiting pedestrians from crossing a street only at and on regularly marked crossings and from diagonally crossing two streets at once. This ordinance is recommended especially for the congested downtown districts where the pedestrians now cross at will.

2—Prohibiting the piling of building materials halfway across the street and restricting this material to 4 or 5 feet from either curb, with a fine for violation. This is a common occurrence in most parts of the city and in some instances in the downtown streets.

3—Giving right of way to traffic continuing along the street in any direction over any vehicles which may be turning into the street from another street.

4—Prohibiting bicycle riders from catching on behind or at the side of other vehicles.

5—Prohibiting children from roller skating, using coasters and the like in streets as well as "hopping" street cars and other vehicles.

The report also recommended that all members remember that section of the traffic laws which gives the east and westerly moving traffic the right of way over the north and southerly traffic.

The Readers' Clearing House

VACUUM OILING SYSTEM DETAILS

Simple Analogy Given—Lubricant Feeds Automatically

CHICAGO—Editor Motor Age—Will you explain the oiling system known as the vacuum? I understand the oil in the crankcase is kept at a fixed level automatically. If possible, explain on what principle this system operates.—J. J. McGivern.

The principle of the vacuum oiling system is shown in Fig. 1. If you were to take a bottle filled with water and invert it over a jar as shown in the upper illustration, the water from the bottle would flow into the jar and air bubbles would be seen passing through the water in the bottle. The bubbling would cease and no more water would flow, as soon as the mouth of the bottle touched the water level in the jar, as shown in the lower illustration. The ordinary distilled water systems seen in many offices are operated on this principle. To apply this to the oiling system of a motor is simple.

As shown at the left of Fig. 1, it will be noted the motor crankcase has extending into it a spout which is part of the oil tank of the system. The tank is filled with oil and this, as shown in the upper illustration, runs into the crankcase through the spout. As soon as the end of the spout touches the oil in the crankcase the flow from the tank to the case ceases. This is shown in the bottom view. As the crankcase oil is used the level drops and the moment the spout end is uncovered oil will flow to the case until it is covered. The only precaution necessary in a system of this sort is to keep the oil tank cap very tight, so as to exclude outside air pressure.

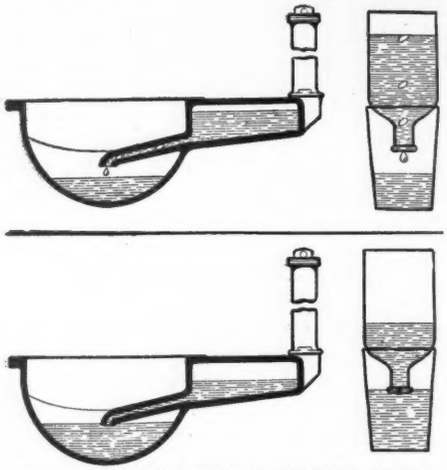


FIG. 1—VACUUM OILING SYSTEM OPERATION

The upper illustration shows how the oil will flow from the tank to the crankcase when the level is below the spout. The action is the same as in the office water system where distilled water is fed into a container from which is drawn through a control cock. The lower illustration shows the level of the oil when the spout has been reached. No more oil will be fed unless the level drops below the spout

STATES MOTOR USES TOO MUCH OIL

Probably a Crankcase Leak or a Worn End Bearing

Tingley, Ia.—Editor Motor Age—I have a 1912 E-M-F 30 which I think uses too much oil. It will only run about 100 miles on 1 gallon. I have painted the oiler with shellac, so I am sure it is airtight. The car has not been run over 2,500 miles and as the compression is good I do not believe it is the fault of the piston rings, although it smokes badly at times.

2—When on a hard pull in intermediate the gears will work out. The gears seem to be in good condition. Instead of plugs in the transmission to hold the gears in place the springs on the H plate are supposed to do this.—J. M. L.

1—The motor is using far too much oil, for it should travel 100 miles on about 1 pint of oil. Look around for a leak in the crankcase. Drive your car over an even dry spot on a paved street; permit the car to stand for about ½ hour and then note if the pavement under the motor is covered with oil. That the motor smokes is an indication that a quantity of oil is getting above the piston top and into the combustion chamber. This condition is due undoubtedly to the excess of oil in the crankcase. The end crankshaft bearings may be worn excessively, permitting the oil to leak to the ground.

2—The subject of gear slippage in the E-M-F was taken up fully in Motor Age, issue of March 19, page 28.

DRILL SIZES FOR S. A. E. THREADS

Table Given Showing Size of Corresponding Taps Necessary

Indianapolis, Ind.—Editor Motor Age—Kindly publish a table of the size of drills to use when tapping for bolts, screws, etc.—F. Hancock.

Below is given the tables of drills you desire:

SIZE OF SCREW	THREADS PER INCH	SIZE OF DRILL STANDARD
¼	20	.191
5/16	18	.248
⅜	16	.302
7/16	14	.354
¼	24	.201
½	13	.409
½	12	.402
9/16	12	.465
⅝	11	.518
11/16	11	.581
¾	10	.632
13/16	10	.695
⅞	9	.745

Drill Sizes for S. A. E. Threads

SIZE OF TAP	SIZE OF DRILL
¼ inch x 28 threads	7/32 inch
5/16 inch x 24 threads	17/64 inch
⅜ inch x 24 threads	21/64 inch
7/16 inch x 20 threads	⅜ inch
½ inch x 20 threads	7/16 inch
9/16 inch x 18 threads	½ inch
⅝ inch x 18 threads	9/16 inch
11/16 inch x 16 threads	39/64 inch
¾ inch x 16 threads	43/64 inch
⅞ inch x 14 threads	25/32 inch
1 inch x 14 threads	29/32 inch
1⅛ inch x 12 threads	1 1/64 inch
1¼ inch x 12 threads	1 9/64 inch
1⅜ inch x 12 threads	1 17/64 inch
1½ inch x 12 threads	1 25/64 inch

The above tap drills allow a thread within 1/64 inch of full thread.

Splitdorf System Feature

College Point, L. I.—Editor Motor Age—In the Splitdorf system used on the E-M-F with horizontal dash coil does the spark occur on the make or break of the primary circuit in the contact breaker?

2—In it sparks on the making of the points on the battery side, and upon the breaking of the points on the magneto, is not the time of the spark changed?

3—What is the function of the second brush used in the Delco distributor on the 1913 Cadillac?—Rudolph Kussman.

1—The battery and magneto circuits used the same breaker points which are incorporated in the magneto. On the make of these points the battery primary is interrupted and on the break the magneto primary is broken.

2—Not materially.

3—It is used to pick up induced and stray current so as to prevent backfiring.

DOUBTS EFFICIENCY STATEMENT

Confuses Mechanical and Thermal Figures—Example Given

Austinburg, O.—Editor Motor Age—In answer to question of X. Y. Z. in the April 16 issue, Motor Age agrees to his statement that the Ford is not a hot-air-connected carbureter. It is true that there is no hot-air jacket for the carbureter, but the air is drawn in through a hot-air pipe with its end almost against the exhaust pipe. Is this not considered as a hot-air connection?

2—Why is it stated in that issue in reply to another question, that gasoline engines are 89 to 90 per cent efficient? In Audel's book on motor cars on pages 41 and 42 this is discussed and the following table given for "heat or mechanical efficiency," quoted from Thurston's "Heat as a form of energy":

	Percent	Percent
Heat transferred into useful work		17
Heat transferred to the cooling water	52	
Heat lost in the exhaust gases	16	
Heat lost by conduction and radiation	15	
	83	83
		100

—T. N.Bates.

1—It was taken that the reader referred to his own car, which is of early make and not fitted with a hot-air attachment. It is known that the present car has such a device but the early models did not have this attachment.

2—If you will read the answer in Audel's book again you will find that the statement heat or mechanical efficiency is not used. Heat efficiency is another way of saying thermal efficiency and mechanical efficiency is another thing entirely. The mechanical efficiency of a good gas engine is correct, as stated in Motor Age. The thermal efficiency may run as high as 30 per cent in good engines.

Why Carbon Causes Knocking

Memphis, Tenn.—Editor Motor Age—What is it that knocks in a motor filled with carbon or overheated, when there is no play in the bearings?

2—In a Bosch dual system, would weak magneto magnets affect the battery's firing?

3—Why would not an eccentric sliding valve, as on a steam engine, do for a gasoline motor, if two were used in each cylinder?

4—What speed does Motor Age think a 1910 model Speedwell, stripped down for racing, should show?

5—Was this car ever in any prominent race?

6—What is the speed of the 1915 rotary valve six?—J. C. Rogers.

1—The knocking is caused by preignition. This condition causes the piston to hit against the cylinder wall just as it

does when the spark is advanced too far.

2—No.

3—Modifications of this form of valve have been tried.

4—About 65 miles per hour, with the proper gears installed.

5—No.

6—About 60 miles per hour.

VALVE-IN-HEAD MOTOR OPERATION

Many Forms of This Construction—Spark Occurrence and Explosion

Brighton, Ia.—Why would improper valve timing cause the engine to overheat?
2—Please explain how the valves in the valve-in-the-head type of motor operate, and illustrate by diagram.
3—Should spark plugs be given a coat of paste before inserting?
4—In a non-vibrator coil how is the current changed to alternating?
5—Do cylinder plugs have to be removed in all makes of motors in order to remove the valves for grinding?
6—When an engine is going fast where is the piston when the spark occurs, also when does the explosion take place?
7—What is the firing order of the Ford?
8—What causes the gasoline to go from the carbureter to each cylinder at the proper time?
9—Where is the piston when the gas enters?—A Reader.

1—Improper valve timing may or may not cause the engine to heat. If the exhaust valves open too late the hot gases remain in the cylinder too long and thus the walls are heated excessively.

2—There are many types of valve-in-the-head motors, some of them being shown in Fig. 2. In some motors, both valves are vertically in the head, in others they are set at an angle, while in some one set is in the side and the other in the head. In operation, all these are similar. In the illustration at the left the valve operating mechanism is shown, of a cylinder with one valve in the head and the other at the side. The valve is set in a guide as shown and pinned at the top just as in ordinary construction. What is called a rocker arm is fulcrumed at the point F. The rocker arm is operated by a tappet rod. The push rod, guide, etc., is similar in construction to that used ordinarily. The up and down movement of the tappet rod causes the rocker arm to see-saw and thus open and close the valve, the closing being accomplished by spring expansion. The valve-in-the-head type shown at B and D are somewhat similar, while those at C and E have a resemblance.

3—Nothing should be done to the plug threads unless they leak. A light coating of stove paste or graphite is a good leak preventer. A clean and level gasket should be placed on the plug seat.

4—A clear conception of the operation of a non-vibrator system will be had by reading the answer to A Subscriber on page 29 of the May 21 issue of Motor Age.

5—In motors with removable cylinder heads or with overhead valves and cages, plug removal is not necessary.

6—With the lever fully advanced the spark occurs a little before top dead center, possibly when the piston is from ½ to ¾ inch ahead. The figure varies in different motors. The explosion occurs when the piston has just reached top dead center.

7—The Ford firing order is 1, 2, 4, 3.

8—When the intake valve opens the piston is going downward and the suction of the piston causes fuel to be drawn into the cylinder.

9—On its downward stroke.

Questions Answered and Communications Received

J. J. McGivern.....Chicago
J. M. L.....Tingley, Ia.
F. Hancock.....Indianapolis, Ind.
Rudolph Kussman...College Point, L. I.
T. N. Bates.....Austinburg, O.
J. C. Rogers.....Memphis, Tenn.
A Reader.....Brighton, Ia.
A. F. Dankinbing...Sweet Springs, Mo.
A. Glassley.....South Whitney, Ind.
W. E. Fraser.....Walnut, Ia.

No communication not signed with the reader's full name and address will be answered.

METHOD OF SOLDERING ALUMINUM

Work Must Be Done Carefully—Formation of Oxide Hinders Process

Sweet Springs, Mo.—Editor Motor Age—Kindly give me the formula for soldering aluminum.—A. F. Dankinbing.

Unlike other substances, aluminum is difficult to solder. The reason for this is that on every aluminum surface there is a deposit of aluminum oxide. This oxide forms very rapidly. If a piece of aluminum were to be heated and then allowed to cool, the oxide would begin to form immediately after the metal was taken from the forge. No solder has been made that will adhere to aluminum oxide. So it remains to get rid of the oxide and at the same time apply the solder. The method is known as tinning.

For this operation a piece of commercial aluminum solder is necessary. This may be obtained at any supply store. The two pieces of aluminum to be soldered are heated first to a red heat and while in this condition some of the solder should be rubbed on the surface and stirred with a metal rod. The reason for this is that in stirring the oxide is scraped off to some extent. The stirring continues until the solder has almost solidified. With this thin coating of solder on the surfaces there is no chance for aluminum oxide forming. If the aluminum were not first tinned then aluminum oxide would form on the surface, making soldering impossible. With the surfaces tinned the operation is just the same as if the metal were copper. A soldering iron and torch are used usually for this purpose.

Don't Remove the Mud Pan

Walnut, Iowa—Editor Motor Age—Would it be advisable to leave off the mud pan.
2—Would a mixture of half mineral oil and half castor oil, heated together, make a first-class lubricating oil?—W. E. Fraser.

1—It would not be advisable, for it would permit mud to cover the lower half of the motor.

2—It would not make a first class lubricating oil. Castor oil is not suitable for ordinary motors and when in use oxydizes readily. The only benefit from such a mixture would be an increase in viscosity.

No Race Drivers' Association

South Whitley, Ind.—Editor Motor Age—What fuel or explosive compound is used in the Peugeot?
2—Do professional race drivers have an association, and if so, what examination must they pass to get a license?
3—Where is the Simms magneto made?—J. A. Glassley.

1—Gasoline.

2—Professional race drivers have no association and they must take no examination to obtain a license.

3—Simms Magneto Co., Bloomfield, N. J.

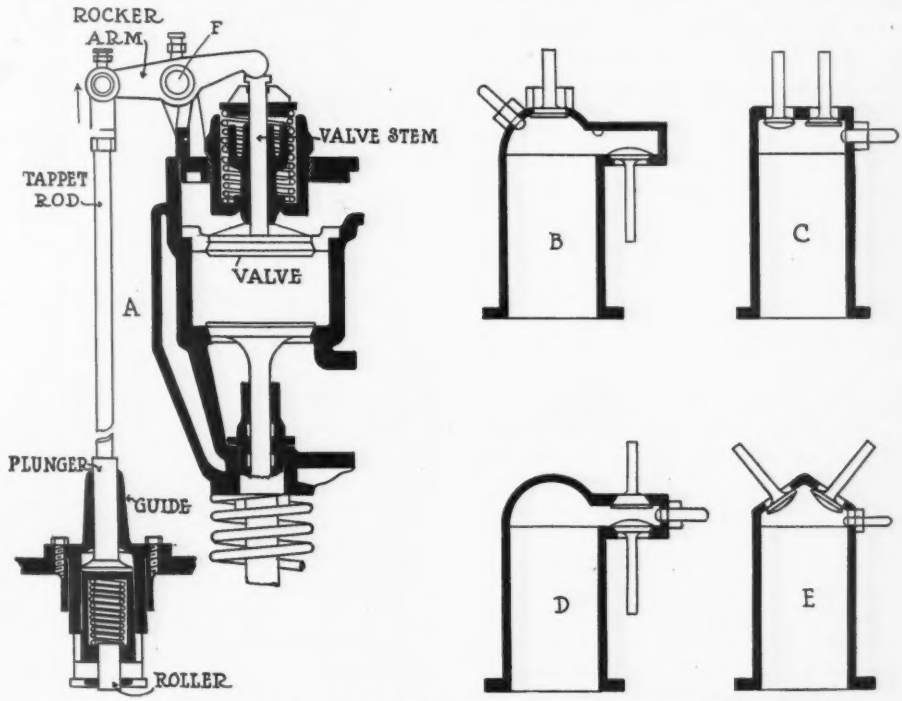


FIG. 0—OPERATION OF VALVE MECHANISM IN VALVE-IN-THE-HEAD MOTOR

At the left is shown the valve mechanism of one type of valve-in-the-head motor and at the right a number of such motor types are illustrated. Note the various valve positions. At the left one sees the tappet rod operated by a conventional camshaft and pushrod arrangement. The tappet operates a rocker arm which see-saws, thus opening the valve and permitting it to close by spring expansion

Rockefeller Sliding-Sleeve Motor Has Controllable Valves

Cooled By Oil—Lubrication By a Special Graphite Compound

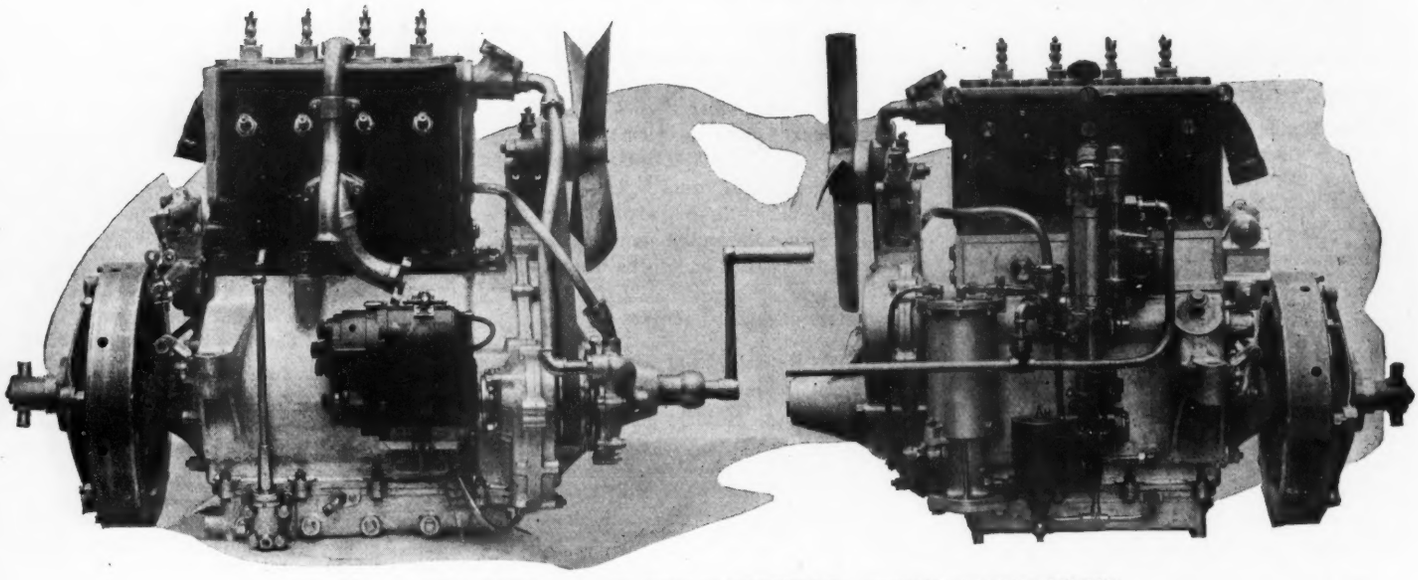


FIG. 1—TWO VIEWS OF THE NEW ROCKEFELLER SLIDING-SLEEVE MOTOR

The illustration at the left shows the magneto side with the spark plugs set horizontally in the head. The right illustration shows the valve side with the carbureter and lubricant container

AFTER a development period of over 2 years, announcement is made by the Perfection Spring Co., Cleveland, O., of the production in marketable form of a type of sliding sleeve-valve motor, known as the Rockefeller, which has removable sleeves, ports which are controllable from the driver's seat, and has a number of other characteristic features.

Sleeve Features

In the Rockefeller motor one sleeve is used for controlling the intake and one for the exhaust, these sleeves occupying the same relative positions as the ordinary poppet valve. In a Rockefeller L-head, for example, all the sleeves are on one side, in a T-head, on opposite sides. One dominant feature is that these sleeves are removable as quickly as are poppet valves, it is claimed. The sleeves are operated by a shaft similar to the crankshaft but of course not as large; and aside from this the little redesigning necessary for the transformation of a poppet to a Rockefeller centers mainly about the cylinder casting.

Relative position of the sleeves, shafts, etc., of this new engine will be clear from a brief study of the illustration in Fig. 2, which represents a section of an L-head Rockefeller. One of the sliding sleeves is shown at S and, this being an L-head motor, the valves are in line and hence all not visible. The sleeve is open at the bottom and top and obtains its reciprocating motion through the connecting rod J which is driven from the shaft L. The latter appears just like an ordinary crankshaft in design. Above the sleeve S is the part FS referred to by the maker as the fixed sleeve and it is threaded into the top of the cylinder as shown. The fixed sleeve is so placed as to leave an annular space A between it and the cylinder casting so

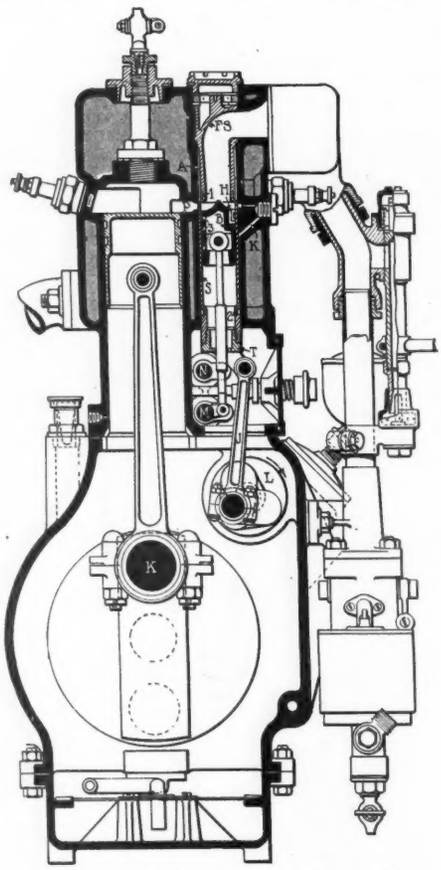


FIG. 2—SECTIONAL VIEW OF THE ROCKEFELLER

The sliding sleeve S is operated by the connecting rod J attached to a shaft L similar to the regular crankshaft. The sleeve controls the port P. The abutment B is controllable from the driver's seat and by this means the flow of gas to and from the cylinder may be regulated

that the top of the sleeve S may move up and down in this space.

Sleeve S has within it a hand-controlled abutment B which may be raised or lowered in order to regulate the size of the opening or port P which communicates with the combustion chamber. The control of the abutment is from the steering wheel of the car in which the motor is installed; but when not moved from the post the abutment remains stationary within the sleeve.

Details of the Valves

Both intake and exhaust sleeves operate in the same way and have a reciprocating movement of about 2.4 inches. The sleeves are of the same length and diameter and are made of either drawn steel or cast iron.

At the upper end of each sleeve are four slots or castellations which permit the gases to enter the port. This slotting serves the purpose of a cut port in the sleeve. In Fig. 5 the sleeve is shown with the castellations O in the top of the sleeve, the opening occupying about 75 per cent of the sleeve circumference. The fixed sleeve FS and the hand-controlled abutment B are shown also.

Now that the sleeve construction is clear, the operation of the sleeve mechanism will be simple if reference is made to Fig. 2, which shows the piston at the end of the during exhaust and compression strokes. When the piston descends, starting the suction stroke, the sleeve continues to rise, leaving the exhaust port closed through suction, compression and explosion. On the exhaust stroke the sleeve descends entirely, thus opening the port.

In order to prevent the leakage of gases on the compression stroke, which must be

considered in such a motor, the fixed sleeve FS is fitted with ring 1 in Fig. 1. At the bottom of the sleeve S is a ring 2 which prevents gas leakage between the sleeve and cylinder casting to the crankcase. Three rings 3 are fitted to the abutment B to prevent leaks to the crankcase. In all cases the rings are made of tungsten steel.

Novel Lubrication System

Another feature of the Rockefeller motor is the lubrication system. Instead of using ordinary oil, a substance called Magnisite is used, which consists of finely powdered magnesia and graphite. A mixture of these is carried in a compression grease cup on the motor and leads taken to the base of each sleeve. In addition to possessing values as a lubricant, this substance is a good insulator from heat, a coating on the sleeves resisting the heat from the explosion chamber and thus keeping the valves cool. Magnisite, to be of value in this engine, requires that the reciprocating sleeves be threaded from top to bottom, instead of being smooth, so that

Each sleeve threads into a thimble T in Fig. 1, on which is a lip for attaching the connecting rod J. This means that the unthreading of the sleeve from the thimble is all that is necessary for removal. It is lifted out through the opening just as a poppet valve is lifted out through the valve plug opening. In replacing the sleeve, it is necessary to again thread it onto the thimble. The abutments are similarly easily removed and replaced.

Oil Used in Cooling

What may be considered more or less of a novelty, which is being developed with this motor, is the use of oil cooling instead of water. Oil worth 15 cents per gallon is used and it is claimed that one filling of the cooling system will suffice for an entire season. The reason that oil is being used is that it boils at a temperature of 450 degrees Fahrenheit, instead of 212, the boiling point of water. Because of this higher boiling point a higher working temperature within the cylinder is obtained, which is desired, as the hydro-carbon motor is a heat motor. It is explained that where water cooling is used, the water boiling at 212 degrees on the top of the combustion chamber, which is the hottest part of the motor, leaves small gas bubbles which are nonconductors of heat, so that the heat is really insulated in the casting, instead of being conducted out, as desired. This action of water occurring at 212 degrees Fahrenheit does not occur with oil until the 450 mark is reached.

One factor has been discovered in connection with this oil cooling, namely, that it has been necessary to place in the jacket space above the cylinder head a graduated pipe of small diameter to conduct the hottest oil from the vicinity of the head.

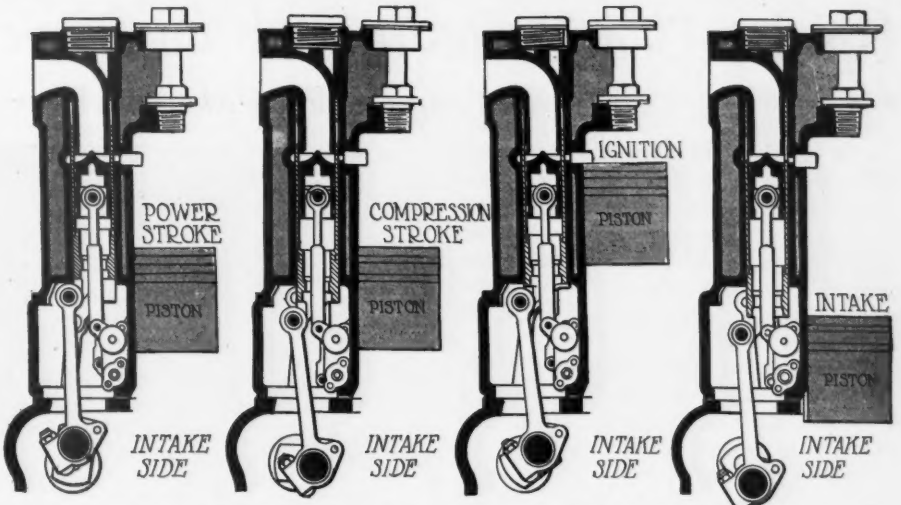


FIG. 4—POSITIONS OF THE ROCKEFELLER SLEEVES AND PISTON
Intake side of engine showing arrangement for four events

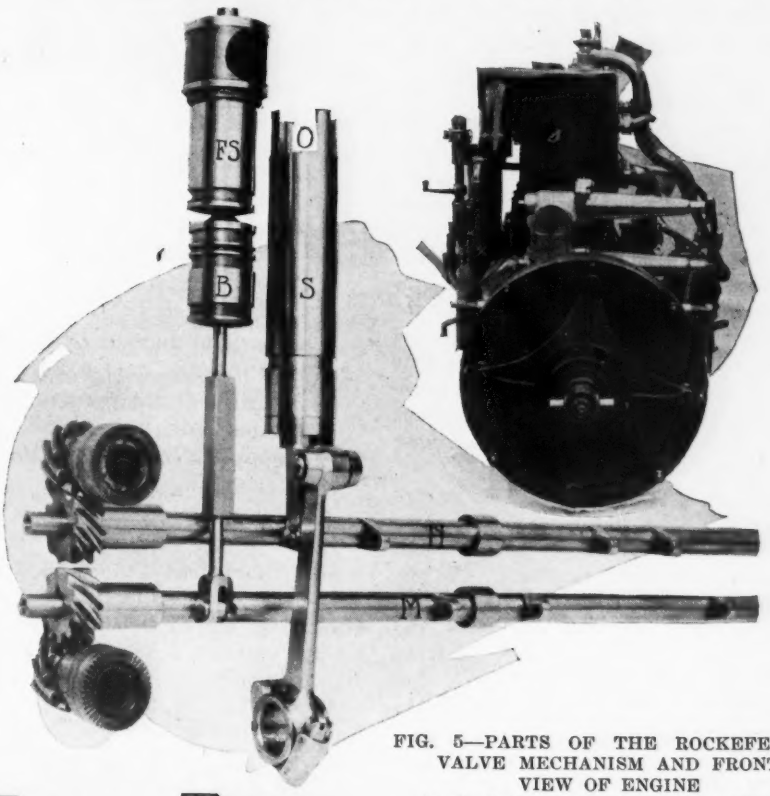


FIG. 5—PARTS OF THE ROCKEFELLER VALVE MECHANISM AND FRONT VIEW OF ENGINE
At the left is the reciprocating sleeve S for the intake and exhaust in each cylinder. Abutment B is within sleeve S and the fixed sleeve FS is a guide for sleeve S

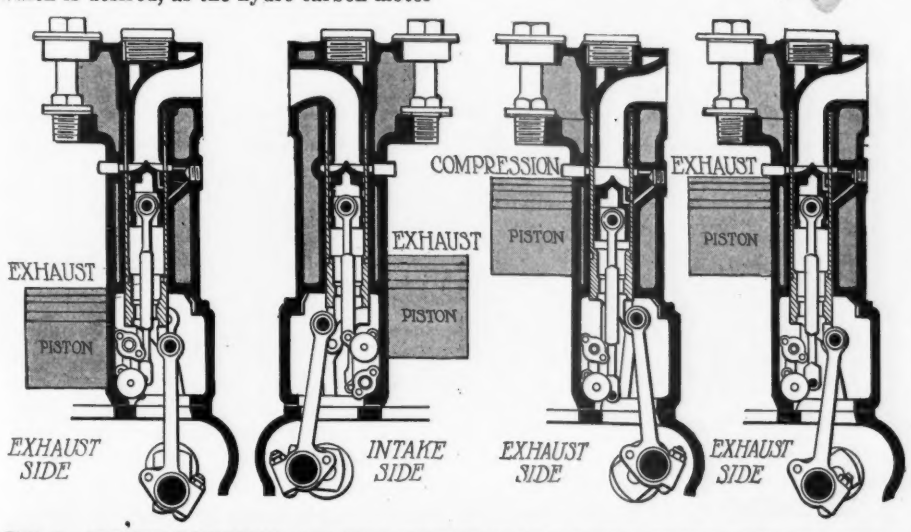


FIG. 3—SLEEVE POSITIONS AT FOUR EVENTS IN THE CYCLE, FRONT VIEW OF ENGINE
This shows the intake and exhaust sides at exhaust and the exhaust side at compression

Stroke Length Increased on New Lozier Light Six

Wheelbase Longer—More Powerful Motor—New Radiator

A NEW series light six Lozier has appeared. It is the largest car the Lozier company ever has built in point of wheelbase and carrying capacity, and its motor has a ½-inch longer stroke than that of last year's light six, although the bore remains the same. The price remains at $3,250.

The new Lozier engine has a bore of 3⅞ inches and a stroke of 6 inches and, except for a few minor changes remains the same in design as its predecessor. The cylinders are L-head type, cast three in a block, and the horsepower developed is said to be about 65. The motor of the previous series showed about 50 horsepower with the 5½-inch stroke, an evidence of what the increase in stroke length means in power developed.

Valve Mechanism Details

The designing hand of J. G. Perrin, the Lozier company's engineer, is in evidence on this newest creation of the concern's shops and reflects in the cleancut arrangement of the various units. The valves are on the right and valve mechanisms are completely inclosed against dust and to deaden noise. The valve lifters are of the rocker form, and this tends to a quieter operation than with the usual straight type, it is believed. To promote a truer valve seating and at the same time prevent uneven wear, the springs are of the taper form.

Working parts have required no change in general design. There are three main bearings for the crankshaft and an equal number supporting the camshaft. The pistons are each fitted with four rings, three above the wrist pins and one below, the lower acting as an oil ring to prevent the lubricant from working up into the combustion chambers. Oil grooves are cut in the faces of the pistons to aid in the even distribution of the lubricant on the cylinder walls.

Lubrication is of the conventional combination force-feed and splash type. A gear-driven oil pump located in the engine base forces the oil from the pump to the main crankshaft bearings, the main lead from this pump passing to a dash gauge and thence back to the point of circulation. This main passage also has leads running from it to the bearings, the surplus flowing back into the individual troughs under each connecting rod. There is a small dipper on the end of each rod which scoops up the oil and sends it up into the cylinder and piston bearings. Leads also carry the lubricant to the camshaft bearings, the timing gears and magneto and pump gears. Thus all parts are well taken care of, and this is an aid to efficient power output.

A Bosch magneto is retained for ignition, being on the side opposite to the valves and driven from the end of the centrifugal water pump shaft. The Gray & Davis cranking and lighting system also is retained, and is independent of the ignition. There are separate units for generation of the current and for starting the engine.

They are both located on the right side of the engine. The generator is placed just back of the fan-driving pulley and is driven from the rear end of the fan-driving shaft. The cranking motor pinion meshes with teeth cut in the periphery of the flywheel. At ordinary driving speeds of about 15 miles an hour, the generator charges at the rate of 12 amperes. The storage battery is of 120 ampere-hour capacity and is of the 6-volt type.

Operation of Starter

Starting is in the usual way. A conveniently-located pedal, when pressed down part way, sends a small amount of current to the motor, turns its pinion slowly and at the same time draws it into mesh with the teeth in the rim of the flywheel. When the pedal is then pressed all the way down, the full current goes to the motor, and it turns the engine at about 100 r. p. m.

The gearset, which is in unit with the engine, is arranged for center control and gives the usual three speeds ahead. The drive is taken through the rear springs, which is a factor for lightening the construction. This is a change from the previous light six, which had a torsion tube inclosing the drive shaft. The new construction eliminates this tube as well as side torque arms. There are two universal joints on the shaft, and in order to take the drive, the rear springs had to be increased in size somewhat.

The rear axle is a floating type and is mounted on ball bearings throughout. The rear spring suspension of the full platform type, and always a distinguishing Lozier feature, is retained. It consists of a rear

NEW SERIES LOZIER SIX TOURING CAR WHICH HAS 23-INCH DOORS

FEATURES OF NEW LOZIER SIX

Motor power increased from 50 to 65 horsepower

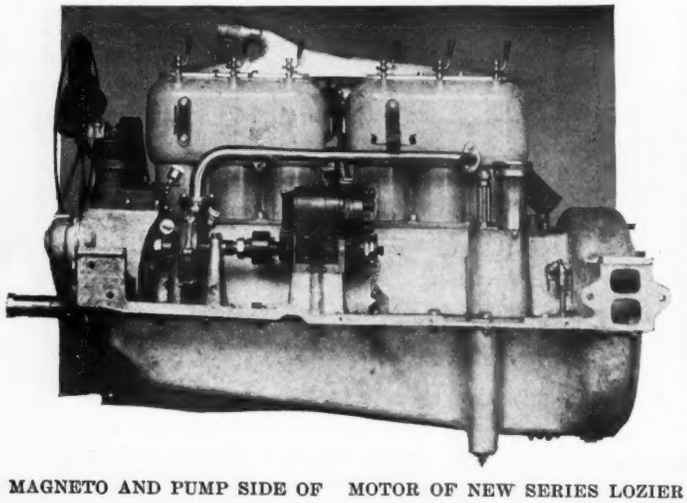
Stroke now 6 inches, previous motor 5½ inches

Wheelbase increased from 128 to 132 inches

Body doors are 23 inches wide front and rear

New round-nose radiator

Price remains unchanged at $3,250.



MAGNETO AND PUMP SIDE OF MOTOR OF NEW SERIES LOZIER

cross spring shackled at its center, and fastening at its ends also through shackles to the rear ends of two side springs, which attach at their front ends to the side members of the frame.

Other chassis features, such as multiple-disk clutch, left drive and center control, 36 by 4½ tires, and 16-inch brakes internal and external are retained.

Lengthening of the wheelbase has been 4½ inches to 132 inches. This was done in order to provide room for the new convertible five- and seven-passenger body with vanishing-type extra seats. When not in use these extra seats fold into the backs of the front seats where they are out of the way of the passengers. They are really concealed when not in use and are very similar to those used on the present Lozier four.

Wide Doors Used

Twenty-three-inch doors front and rear with concealed hinges are featured in the new six. They improve the appearance of the car noticeably and provide more room for the passengers getting in or out of the car. In fact, commodiousness has been the keynote in designing the body. It is noticeably larger, both inside and outside. The preceding model provided room for five passengers only, while the new body readily takes care of two more.

One new feature which impresses the average observer at once is a round-nosed radiator, which gives a very pleasing head-on view, although it does not change the standard Lozier radiator form. It is really a coping-over of the edges of the cooling apparatus, and is only an added refinement. The instrument board also has been moved up to the top of the cowl where it is at the driver's finger tips.

The new six weighs under 4,000 pounds, which is rather a tribute to its designers, inasmuch as its wheelbase is considerably longer than its predecessor and even with this added, the weight is only 85 pounds greater.

Equipment is complete in every detail and includes such apparatus as a specially-designed tire pump, engine-drive, inclosed speedometer drive, one-man top, easily operated rain-vision, ventilating windshield, robe and foot rests, headlight dimmers, and rebound absorbers, and trunk rack.

Running boards are kept entirely clear, and with pure streamline body, it is as pretty a Lozier as ever left the plant. The convex rounded fenders set close to the wheels add their touch of beauty to the design.

GAS-ELECTRIC CAR ANNOUNCED

Galt, Ont., June 2—Announcement comes from Galt, Ontario, Can., of a gasoline-electric car which in five-passenger touring car form will travel 30 to 40 miles on 1 gallon of gasoline. This car, called the Galt and shown herewith, is equipped with a two-cycle gasoline engine, a five-kilowatt direct current generator and storage batteries. The generator appears to be used for charging the batteries which in turn propel the car as in an electric vehicle. The control is by means of a constant torque controller which affords five forward and three reverse speeds. The average speed of the car is from 25 to 30 miles per hour and it is stated will operate as well on kerosene as on gasoline for engine fuel. The illustration herewith shows the first car built which has, up to this time, run 1,185 miles.

TALK NEW YORK DOCK PROBLEMS

New York, June 2—"Motor Trucks and the New York Dock Problem" was the general subject of discussion at last week's meeting of the Motor Truck Club. The meeting was addressed by Dock Commissioner R. A. C. Smith, J. K. Orr, president of the New York Team Owners' Association, and Willard B. Britton, an engineer who has studied the dock problem in both America and Europe. Mr. Britton's talk was illustrated with stereopticon views showing conditions and facilities for loading and unloading at several of the greatest ports of the world.

Commissioner Smith offered to appoint a committee to confer with a committee to be appointed by the Motor Truck Club on plans for the relief of the present conjested condition of New York freight terminals. He expressed his sympathy with the effort on the part of truckmen and merchants to alleviate the present conditions and his willingness to co-operate in any feasible plan for improvement.

J. H. Gardiner, vice-president of the New England Steamship Co., operators of the Fall River Line boats to Boston, was to have attended, but found it impossible. Instead he instructed J. E. Owsley to address the following letter to the club. This letter was read by the president, George H. Duck:

"The question of terminal conditions and improvements thereto is one that the New England Steamship Co. is giving much and careful consideration.

"It has made a decided change in the method of handling its freight, and the location for receiving its outbound freight. The electric freight truck has been installed to handle all its outbound freight and such of its inbound freight as is economical and the matter of time will allow . . . afforded the shippers and the economy in handling has proved the wisdom of the change.

"Formerly there was a mixture of loaded and empty wagons entering and leaving the pier. One had to wait for the other, due to the fact that, with the handling of outbound freight with the hand truck, it was necessary to receive this freight as near to the freight gangways of the ships as possible to obtain the most economical hand trucking distance.

"Now all freight is received at a receiving platform at the bulkhead. No teams loaded with freight use the pier, which is entirely for the use of people looking for inbound freight. This elimination of loaded teams from the pier has taken away 900 teams a day from the pier.

"Under the old arrangement, the teamster with one or two light shipments had to wait as long to get his freight to the receiving place 500 feet down the pier as the man with a full load. It is now a regular occurrence to see such a teamster draw up his wagon within 75 feet of the receiving platform and tote over his several packages and get away within a very few minutes.

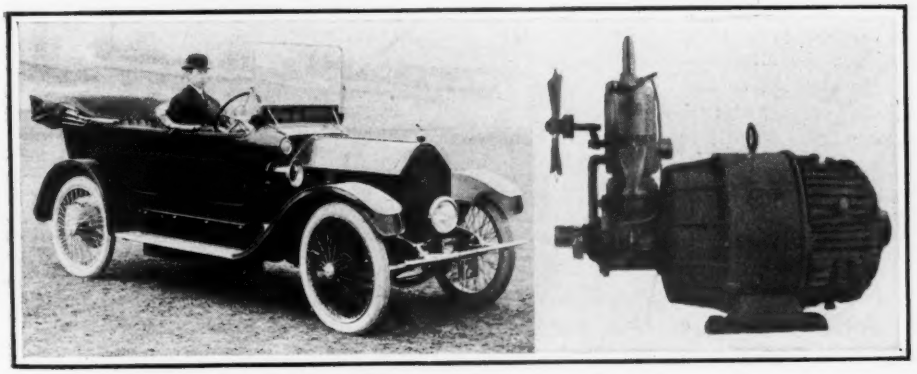
"There are a great many small details in connection with this installation that will strike a pier manager as useful and beneficial, but are too numerous and somewhat trivial to take up your time. It will, however, give me great pleasure to go over the matter individually at any time or to have any one of you visit the pier at any time."

ECONOMIN A NEW MOTOR FUEL

New York, June 2—A new fuel for internal-combustion engines is announced in British papers under the name of Economin. This has for its base 80 per cent of kerosene, the remainder being chemicals which form an emulsion. Then the mixture is distilled and gives a fuel which is cheaper than gasoline, in England at least, and which gives more power from the same motor. It is further claimed to give practically perfect combustion so that there is almost no carbon deposit in the cylinders, to be almost odorless and to make an easy starting motor. It can be used with the same carbureter adjustment as gasoline.

LONG TEST OF A MOTOR

Jersey City, N. J., June 2—A Cadillac motor owned by the Crescent Automobile Co., this city, has been running since April 8 and has run a distance equivalent to 22,000 miles over the road. It is said to have shown no signs of overheating, although only 1½ pints of water have been poured into the radiator. The cylinders and bearings are lubricated with Polarine oil, fed at the rate of twenty-six drops a minute. The motor has been run at from 600 to 700 r.p.m., making about 535 miles a day, or a little over 22 miles per hour. It has averaged 44 miles to a gallon of Standard motor gasoline.

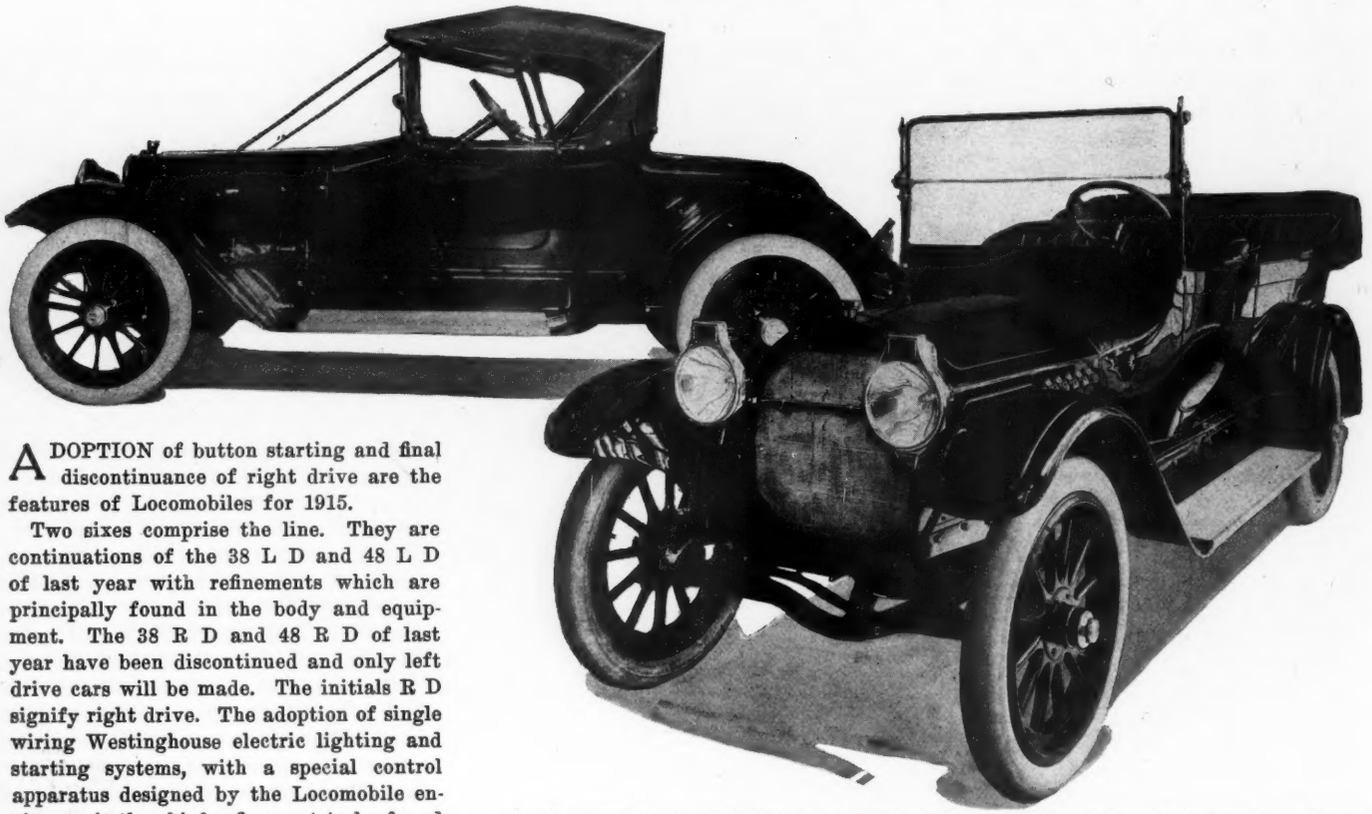


NEW GAS-ELECTRIC GALT CAR

This car is controlled like an electric vehicle and uses both gasoline and electricity as motive power. The power plant shown at the right consists of a two-cycle gasoline engine and a 5-kilowatt generator for keeping the batteries charged

Locomobile Adopts Left Drive Exclusively on All Models

Button Starting for Westinghouse System—Many Refinements



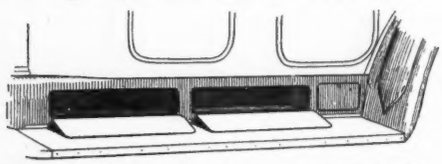
THE UPPER ILLUSTRATION SHOWS LOCOMOBILE SIX ROADSTER. LOWER SHOWS THREE-QUARTER VIEW OF NEW SIX WITH ODD HEADLIGHTS, WHICH DO AWAY WITH SIDE LIGHTS

ADOPTION of button starting and final discontinuance of right drive are the features of Locomobiles for 1915.

Two sixes comprise the line. They are continuations of the 38 L D and 48 L D of last year with refinements which are principally found in the body and equipment. The 38 R D and 48 R D of last year have been discontinued and only left drive cars will be made. The initials R D signify right drive. The adoption of single wiring Westinghouse electric lighting and starting systems, with a special control apparatus designed by the Locomobile engineers, is the chief refinement to be found for the coming season.

Special Electric Control

With this control, starting has been reduced to the pressing of a button and the shifting of the starting gear is accomplished electrically through a solenoid instead of manually. All the electrical push buttons are now placed in a vertical row on the instrument board and the starter button, being placed at the bottom, can be operated by the foot. The other refinements include the use of drop forgings for many of the small parts such as windshield bracket, bonnet clips, throttle levers, etc. The top is provided with a lining concealing the bows and in the interior work, the decorative scheme has been considerably improved. The fenders are more heavily crowned than last year and are made of one piece, the brakes are 2 inches larger in diameter and the tread has been widened to the Standard 56, instead of 54.5.



TOOL COMPARTMENT IN THE MUD APRON OF THE NEW LOCOMOBILE

The two motors for the 38 and 48, known respectively as the little six and big six, are exactly similar in design. In fact, they do not depart much from Locomobile practice of the last 2 years, except that when this company changed to left drive last year, the alterations necessary in putting the steering columns on the other side of the motor had to be made. Both motors have T cast cylinders in groups of two with integral waterjackets except for the waterjacketed caps, which are separate. The motor sizes are respectively 4¼ by 5 and 4½ by 5½, giving S. A. E. ratings of 43.35 and 48.6. The makers claim an actual horsepower output of 63 and 82 at a crankshaft speed of 1,800 r.p.m. on the dynamometer.

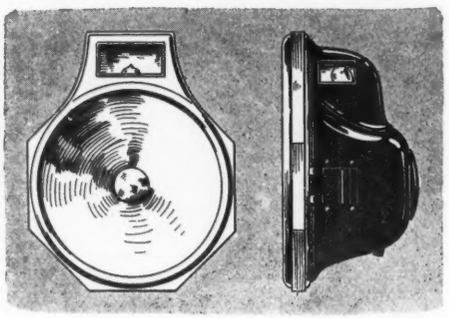
Timing gears are of spiral design and the camshaft has the cams integral and acting directly on roller followers. The push rods are carried in exceptionally long guides. The cooling system operated by centrifugal pump located on the forward end of the exhaust. The radiator is a honeycomb and is larger than last year, to fit the streamlines. It rests in a steel cradle on rubber bumpers. The fan is of aluminum with six blades. It is mounted on a bracket fixed to the timing gear case.

FEATURES OF THE 1915 LOCOMOBILES

Right drive models discontinued
All electrical buttons on cowl
Two sixes retained, 38 and 48
Starter operated by a button
Small parts now drop-forged
Brakes larger than last year
Tread made wider by 1½ inches
Many refinements in chassis and body

Single-Wire Lighting

The electrical system comprises a Westinghouse single-wire equipment for starting and lighting and a Bosch dual system for ignition. This provides a three-unit electrical equipment, as the starting motor and electric generator are separate. The starting motor has a gear on the end of the armature shaft which meshes with the fly-



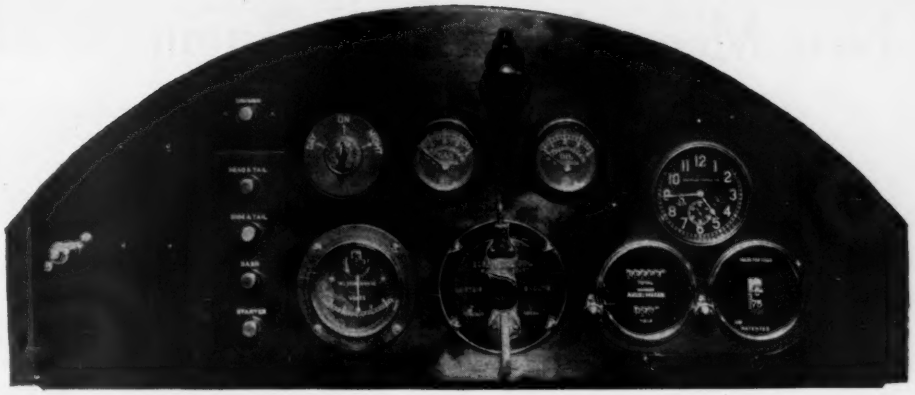
NEW HEADLIGHTS USED ON 1915 LOCOMOBILES

wheel gear as soon as the starting control button on the dash is pressed. This is accomplished by a solenoid which is in operation as long as the button is depressed. The generator has a normal output of from 12 to 14 amperes at 13 miles an hour. It picks up the load at 9 miles an hour and can carry at 15 miles an hour the entire set of lamps.

Details of Lighting Generator

The generator field windings are aluminum wire, which is used because of the property of aluminum for increasing or decreasing its resistance in proportion to the heat or cold. In cold weather the resistance of the field windings is low and the output consequently high when most needed. In the summer the output of the generator is reduced, thereby automatically providing for the requirements of the battery in hot weather. The use of the single-wire system on all the cars cuts down almost half the wiring required as the frame and metal part of the chassis are used for the return current to the battery. The cowl panel is wired as a unit and can be removed from the car by disconnecting the main leads from the chassis. A six-fuse box is provided on the cowl panel and can be reached by raising the bonnet.

The lock switch shows three positions, on, day and night. It can be locked in any one of the three positions by the same key which operates the bonnet lock, tool boxes and tires. In the day position the magneto is grounded, the lamps cannot be lighted and the starter and horn are inoperative. In the night position conditions are the same as in day, except that the side and tail lamps are lit. The dash lamps are entirely done away with on the touring models, an extension on top of the headlight incorporating the side lamp bulbs. On the roadster the inset dash lamp still is employed.



THE 1915 LOCOMOBILES ARE FITTED WITH A DASH AS SHOWN ABOVE

The lubrication system is contained within the motor and is operated by low pressure gear pump. The leads are carried to all the motor bearings, providing an equal distribution of the lubrication. A new feature of the lubricating system is a compartment in the oil pan which is covered by a plate in such a manner that the oil is held in the rear part of the motor when the car is descending a hill. This prevents flooding the front cylinders at such times.

Slight Carbureter Changes

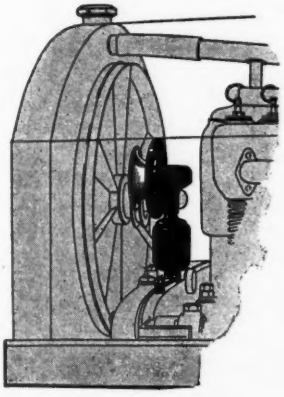
The new carbureter adopted last year is continued with a small alteration in the air valve and with a new strainer in the float chamber. The alteration of the air valve consists in the adjustment of both springs from the steering column, whereas last year only one spring was affected by the steering column control. The carbureter is fed by pressure from a 28-gallon tank at the rear of the car.

The clutch is a multiple-steel disk design with the saw steel blades housed within the flywheel running in oil. The oil recommended by the manufacturers is engine oil and kerosene in equal parts. The clutch disk retainer is carried on a double row of ball bearings at the motor end and a single row of ball bearings at the rear end. The entire clutch can be removed from the car without interfering with any other part. The universal joint is placed between the clutch and gearset. A four-speed gearset is used.

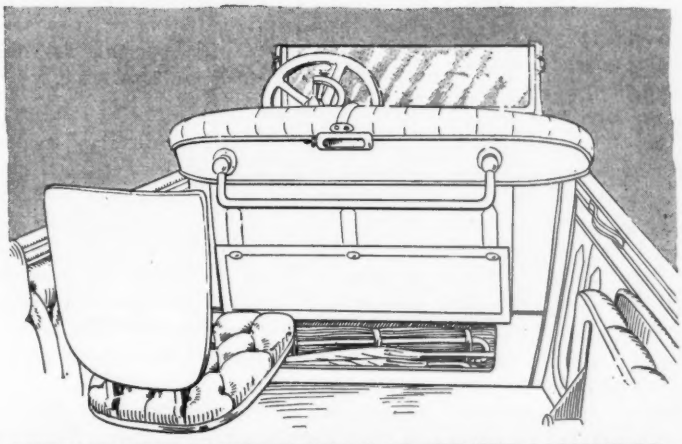
The drive-shaft is provided with a universal at each end and is not inclosed. A pressed steel channel torque beam and radius rods take care of the torque and distance functions and in the case of the torque channel, lightness is provided for by providing holes in the web. The rear axle is floating and is driven by a bevel differential through a pair of chrome-nickel steel shafts. The housing is built up of steel tubes pressed together under a hydraulic force of 9 tons and then riveted. Brake drums are bolted to the rear wheels and on all models except the roadsters double drums are used. The diameter of the foot brake is increased 2 inches over last year and are now 16 inches. The front axle is an I-beam of drop-forged nickel steel with a tensile strength of 87,000 pounds to the square inch.

This year the tires are 37 by 5 on all the heavy models. These can be inflated to 90 pounds pressure in about 2 minutes by means of the air compressor which is mounted on an extension of the front end of the gearset countershaft and which can be engaged by a clutch control through a T-shaped handle in a compartment on the side of the car. This compartment also holds the tube, which can reach any tire.

The body and equipment are of luxurious finish and the streamline form in connection with the flush sided body agrees with the latest dictates in design. Left drive and brake with center gearshift lever is on all models.



A novel position for the electric horn, under the hood behind the radiator.



INTERIOR VIEW OF THE TONNEAU OF THE NEW LOCOMOBILE

FUEL RUN FOR GEORGIANS

Savannah, Gea., June 2—In order to allow some of the counties more time in which to put the roads in condition, the Savannah Automobile Club has decided to postpone the run to Columbus from May 25 to June 15.

The club has decided to base the awarding of the trophy and purse on gasoline consumption, taking into consideration the weight of the cars. Fifteen cars are entered. The run will be open to all.

NONES FAILS TO OUST BOARD

Louisville, Ky., June 2—W. C. Noones' effort to oust R. V. Board as president of the Kentucky Wagon Mfg. Co. met with failure at a meeting of the stockholders of the business yesterday afternoon, when all the old directors, with but one exception, were re-elected, meaning that Mr. Board will continue at the head of the company.

New Monarch Six Uses Automatic Starting Transmission

Continental Motor—General Construction Like the Four

FEATURES OF NEW MONARCH SIX

Parts of standard make
Body is streamline
New warm air attachment for carbureter
Continental motor
Bore and stroke 3½ by 5 inches
General construction like the four
Price is $1,400

FRONT VIEW OF THE NEW MONARCH SIX

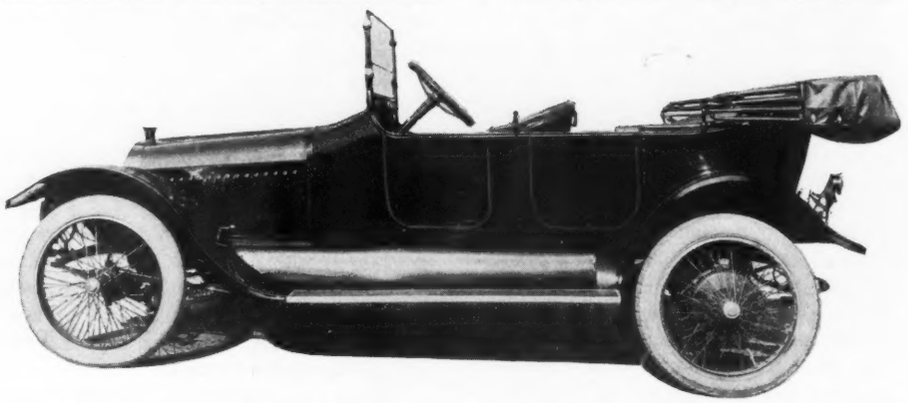
THE Monarch Motor Car Co., Detroit, of which R. C. Hupp, long connected with the motor car industry, is the head, has added a six-cylinder touring car of five-passenger capacity to its output of four-cylinder touring cars. The new six is a true streamline proposition and has most graceful lines. It is built upon the same general constructional basis as the fours, but the chassis is of course lengthened out, the tires are larger and all other parts are made consistent with the greater size.

Standardization is the word with Mr. Hupp, and such is reflected in his cars. The motor of this new car is a Continental standard type, the rear axle is a Salisbury, the gearset comes from the Detroit Gear & Machine Co., the steering gear is a Warner, the wheels are of Mott make, and so on.

The motor is an L-head, block-cast type, having the nearly standard cylinder dimensions of 3½ inches bore and 5 inches stroke. This gives about 40 horsepower at a normal speed of about 1,200 revolutions a minute, although the S. A. E. rating accords it only about 30 horsepower. The motor and gearset with which it is combined are suspended conventionally at three points of the frame, one at the front and two at the rear.

Construction of Manifolds

The exhaust header attaches directly to the right side of the cylinder block, with an individual opening for each cylinder, while the intake passes across through the casting from the opposite side of the engine. There is the usual short intake pipe from the carbureter running to the cylinder block, and distribution to the valve pockets is effected within the casting itself. This has the advantage of reducing external complication and is conducive to better mixtures, since vaporization is aided by the passage through the jacket spaces.



THE ABOVE ILLUSTRATION GIVES ONE A GOOD IDEA OF THE NEAT LINES OF THE LATEST MONARCH PRODUCT

One special feature of note is the provision for the sending of warm air to the carbureter air intake. In the top of the cylinder block is cast a transverse passage open at the end next to the exhaust pipe, and joining at the opposite end to a tube connecting with the carbureter air intake. Thus, warm air from the cylinder head as well as that from the exhaust manifold goes to the mixing apparatus to further aid efficient vaporization.

Details of the Motor

There is nothing out of the ordinary about the general construction of this Continental engine. The timing gears are housed fully at the forward end, and these gears have spiral teeth to insure quietness. Accessibility has not been lost sight of, however. The valve mechanisms are also completely covered by two aluminum plates, removable after the two thumb screws for each have been released. These plates are provided with openings in their tops, allowing for breathing from the crankcase up through the valve parts and out to the open air. The flywheel is entirely inclosed, but there is a cover plate at the top which can be removed for inspection and for checking the timing.

Latest motor engineering, of course, holds for the working parts of the motor as well. The crankshaft and camshaft, both of liberal size, are mounted on three bearings each. The crankshaft, which is 2¼ inches in diameter, has a front bearing 2⅞ inches long, a center 2½ inches long and a rear 3 inches. The connecting rods, also drop forgings, are provided with 2 ⅛-inch bearings. The pistons carry three rings and have paid due homage to the grinding tools and gauges before assembly.

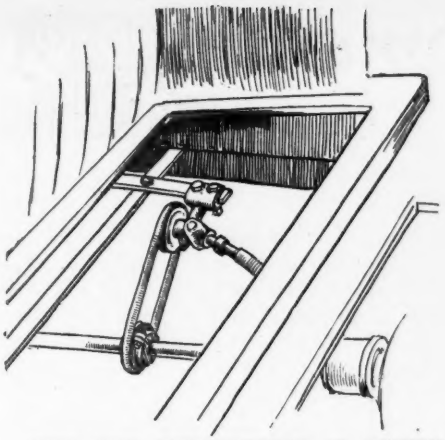
The oiling system combines force feed and splash of the constant level type, and the reservoir holds 1½ gallons, a gauge on the side of the crankcase indicating the amount in the motor.

On the right side is the water pump and generator shaft. The pump is driven ahead of the electrical unit, which is a part of the Auto-Lite system with which the car is equipped. Ignition and lighting functions are combined. A Connecticut distributer is used, the coil of the latter being mounted directly back of the generator on the crankcase. The cranking motor is installed on the rear left side of the motor so as to be close to the flywheel, which it drives in starting, through teeth cut in the rim. The cranking motor is installed in connection with a Bendix automatic transmission, which automatically engages and disengages with the flywheel on the pressure of a button. This Bendix apparatus utilizes centrifugal force to draw the teeth out of mesh after the motor starts. Its operation has been fully described in a previous issue.

Clutch Features

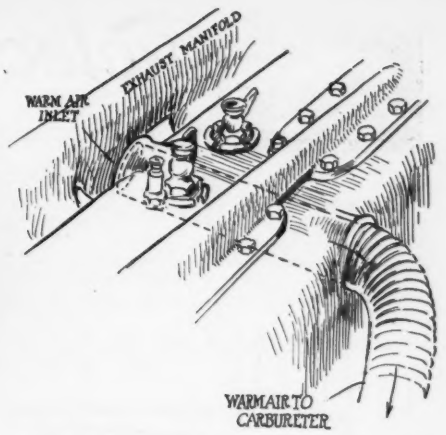
Inclosed within the flywheel and gearset housing is a Hartford leather-faced cone clutch made from pressed steel and provided with adjusting springs which can be reached through a hand hole in the housing. The main clutch spring exerts a 225-pound pressure upon the clutch-cone, while a ball-bearing throw-out also is used. The gears and shafts are of chrome-nickel steel. Gears have a ¾-inch face.

The drive shaft is uninclosed and has a universal at either end. The rear



HOW THE SPEEDOMETER IS DRIVEN FROM THE MAIN DRIVE SHAFT ON THE MONARCH SIX

LEFT DRIVE AND CONTROL LEVERS OF NEW MONARCH



TRANSVERSE PASSAGE IN CYLINDER HEAD FOR CONDUCTING WARM AIR TO CARBURETER

axle is a semi-floating type of very strong construction, having brace rods and strong housing. The gear ratio is 4⅓ to 1, which is low enough to give the motor fair play. On the pinion shaft, New Departure ball bearings are used, while Hyatt bearings are found on either side of the differential and on the outer ends of the axle shafts. The latter are made from 1¼-inch nickel steel and have a long taper on their outer ends, where the rear wheels are fitted on. The axle housing is so designed that the cover can be removed for inspection without losing any of the grease.

External and internal brakes 12 by 2 inches act on the rear hubs, and the equalizers are arranged on two shafts. Two radius rods, one on either side of the drive shaft and running from the axle tubes to almost the center of the chassis, are used. These take all of the driving load.

The rear springs are elliptic and this feature tends to easy riding. These springs are underslung from the axle tubes and are mounted outside the frame side members. The front springs are of the regular semi-elliptic form. Wheels are of wire and carry large size tires, 32 by 3½ inches front and 33 by 4 rear. The wheelbase is 118 inches.

Like the four, the six has the gasoline tank in the cowl, 10 gallons being its capacity. This tank is completely concealed in accordance with present day practice, and when in place really is a part of the body. The front seat may be entered from either side, and five passengers are easily and comfortably carried. Control is in the center and steering on the left.

The equipment is complete and includes Jiffy curtains, rain-vision ventilating windshield, tire carriers, speedometer, headlight dimmers, and so on. The price is set at $1,400.

PHILIPPINES ABSORBING CARS

Washington, D. C., June 2—Of the noncontiguous territories of the United States the Philippine Islands are the ones showing the greatest gains in the receipt of shipments of American motor cars, according to figures made public today by the federal bureau of statistics. During March last 65 cars were shipped to the Philippines, the value being $55,736, while in March a year ago the number was 17 and the value $23,862. During the 9 months ending March, the number of cars shipped there from this country was 345, valued at $413,840, in 1913, and 518, valued at $614,679, in 1914. Shipments of parts, except engines and parts, decreased in value from $15,122 in March, 1913, to $9,673, in March last, but increased from $40,458 to $58,171 during the 9 months' period.

There were three cars shipped to Alaska in March last, the value of which were $2,875. None was shipped in March a year ago. During the 9 months' period the number increased from five, valued at $8,050, in 1913, to twenty-four, valued at $22,008, in 1914.

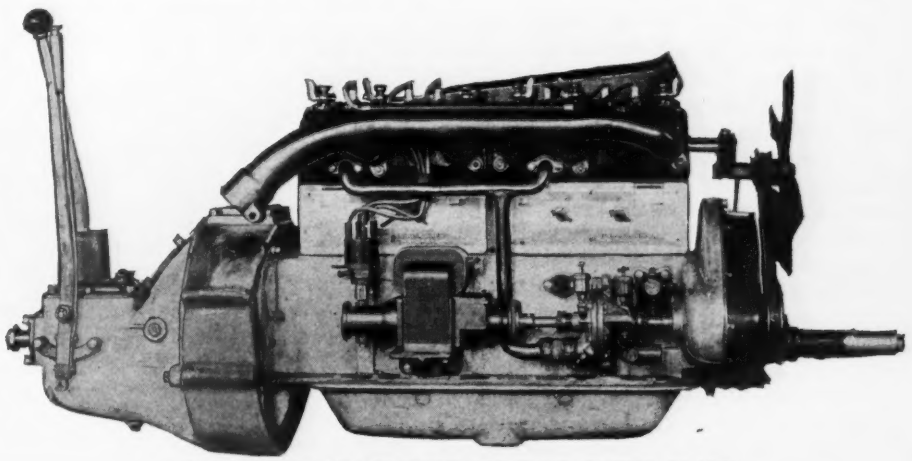
The receipts of cars from the United States into Hawaii during March, 1913, was fifty-five, valued at $90,972, while in March last the number was eighty-one, but the value was only $77,179. During the 9 months' period the number decreased from 535, valued at $891,538, in 1913, to 506, valued at $652,781, in 1914.

Porto Rico took twenty-two cars, valued at $33,106, in March, 1913, and twenty-one, valued at $16,761, in March last, while the number during the 9 months' period decreased from 267, valued at $330,322, in 1913, to 223, valued at $255,555, in 1914.

TO MAKE REEDSBURG TRUCK

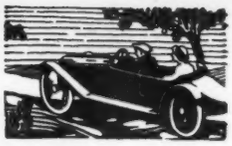
Reedsburg, Wis., June 2—The Reedsburg Motor Truck Co. has been incorporated with a capital stock of $100,000 to engage in the manufacture of a motor truck formerly manufactured by the Piggins Motor Truck Co. of Racine, Wis. Reedsburg capital has been interested in the project by E. M. McNab, formerly designer for the Piggins company, who has been working in central Wisconsin for several months to interest local capital in the establishment of a motor truck factory. Among the prominent Reedsburg people who have become associated with Mr. McNab are E. E. Montgomery, Edward Thom and J. Seamans. Arrangements are now being made for a factory, which will be limited at first and extended as the business grows.

The truck will be styled the Reedsburg. It is of the internal spur-gear drive type and has been redesigned for special adaptation to heavy duty work in the hilly country in the vicinity of Reedsburg, Baraboo, Kilbourn and other points in the vicinity of this city.



VALVE SIDE OF MONARCH SIX UNIT POWER PLANT

Cyclecar Development



Possibilities of Shaft Drive

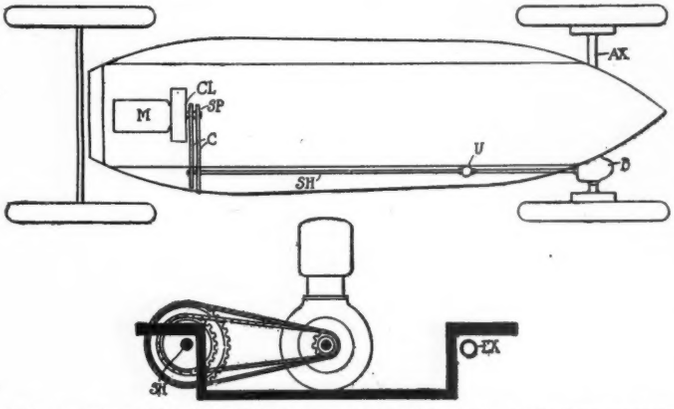


FIG. 1—TWO-SPEED DOUBLE CHAIN DRIVE WITH SHAFT UNDER SILL AT SIDE

MAKERS are busy developing their cyclecars from their first year's beginnings, as big car makers are always working at new models years ahead. Others are starting in with new models. The result of all this experimenting will be the next step in the development of the industry.

All those makers and dealers who are interested in the cyclecar are anxious to make a product which will fit the public mind as well as do the work required, and hence, while retaining those things they feel necessary for performance, are trying to eliminate so far as possible the minor details the public needs to have explained to it before buying. There is a tendency to fit design to sales and hence cheapen the marketing by requiring less argument to sell.

Entrance and Exit Considered

One of the first things the public mentions regarding the new cars is the matter of entrance and exit. Makers are taking care of this by fitting doors or lower sides, with steps or footboards. The difference in dust protection is made up by the running boards and curving fenders which follow the line of the wheel, instead of going off tangent.

Another item the public asks about is the exposed types of drive, and they look for the appearance at least of the drives they are used to. To fit a shaft drive to a car, built as low as the cyclecar on narrow tread must be is a problem, as the shaft cannot run under the floor without raising the body to too great a height, and the expense of this drive must be watched also. It should not be impossible, however, to make this type of drive as cheap as the usual types if simplicity of construction is followed.

The drawings show several methods of arranging shaft drive to allow inclosed transmissions and side doors, on the low type cars with staggered or tandem seating. Fig. 1 incorporates a two-speed double-chain drive.

The motor here is set crosswise of the car and on its shaft is built a clutch of the motorcycle type, perhaps. This clutch connects two chain sprockets on the main shaft. The body of the car is made with sills, and under one sill at the side runs a shaft, SH. On this shaft are chain sprockets of different size, connected to the engine sprockets by chain and to the drive shaft by a sliding dog, which can connect one or the other to the drive shaft. At the rear the shaft has a universal joint of the leather type at U, and from there

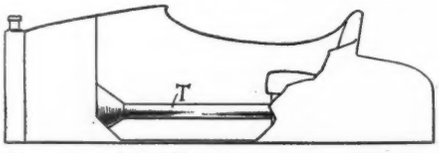


FIG. 3—CORNELIAN SHAFT HOUSING THROUGH CENTER OF CAR

a shorter shaft runs to a bevel pinion on the rear axle at one side, this axle being solid clear across the car, and fitted with a bevel gear.

This drive should be very simple and efficient if properly made. There would be no shaft through the car, construction would be fairly cheap and connections positive. The small amount of extra weight on one side would not bother. The frame construction would be cheap, as the side members could be straight.

Another form, using a gearset with the shaft, is shown in Fig. 2. Here the clutch on the engine shaft connects with two gears of different size mounted on the shaft. Below these are two gears sliding on a shaft, these gears sliding so that one or the other can be brought into action by throwing it into mesh when the clutch is released. This drive would be carried back by the shaft to a universal joint U and from there hangs a bevel to the solid rear axle. This would have rods to hold it central as shown in the lower figure.

The drawings show this on a staggered seat construction with the shaft running back between the seats. The Cornelian cyclecar incloses the drive shaft as in Fig. 3, the clutch, etc., being in the cone part and the tubular shaft in the tubing T, some distance above the floor. This is a side-by-side seater and hence the tube is not in the way of the feet being between the two passengers.

The writer is using the drive shown in Fig. 4 in a car which he has constructed for experimental purposes and which works very well. This car, fitted with a V motor, has a strap joint just back of the motor, connecting the motor to a long shaft. This shaft runs in a tube which completely incloses it. At the rear this tube ends in a housing for a big ball-thrust bearing, which seats in a cross-member by a heavy square thread, so that twisting the tube casing thrusts the tube and bearing to the rear, and thus the shaft and friction plate which are next to it. This tube, then, by its twisting controls the clutch action. Twisting it one way shoves the disk against the friction wheel at the rear, twisting it the other releases it. By the thread action the plate stays wherever it is put, so there are no ratchets to hold it in place.

The tube is rocked by two pedals, when one goes up the other comes down, so that you can regulate the pressure exactly at any point. The jackshaft of the friction is short, and the speed ratio is controlled, as usual, by a lever up front, this

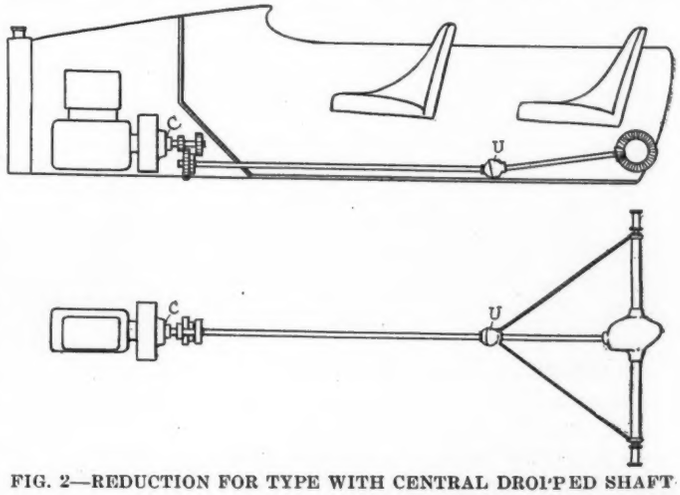


FIG. 2—REDUCTION FOR TYPE WITH CENTRAL DROPPED SHAFT

being on the left. From the jackshaft a short chain takes the drive to a solid rear axle, mounted on cantilever springs from the side.

This construction allows of a side door at the front, the front seat folding to the side of the car to let the rear passenger in, and allow plenty of foot room, for although the shaft is 5 inches above the floor the feet can go under it and its presence is not noticeable except in getting into the car. No universal joints are needed, as the drive is straight, and no chain trouble has been had, though the shaft distance between centers is only 7 inches. The car has covered 1,500 miles and for an experimental job has been very satisfactory.

This drive would work very well with staggered or semi-tandem seats and is very cheap to make. Another drive which might be tried is the long chain. The Ceco is very interesting in this connection, aiming to get rid of the noise by inclosing the chains in tubes lined with fiber. The drive is said to be very successful so far as tests have gone.

A drive of unusual interest is the Duryea roller drive. This includes pulleys on the rear wheels somewhat like belt drive, but instead of belts a roller wheel of V shape is pressed in the groove. The drive is very efficient, more so than most

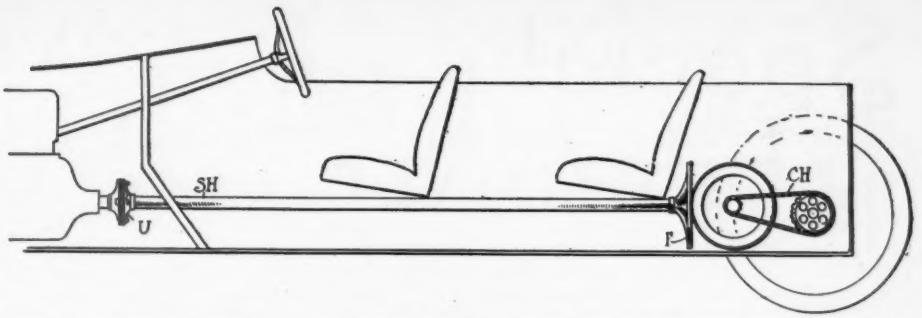


FIG. 4—SHAFT-FRICTION-CHAIN DRIVE AS FITTED TO SEVERAL CYCLECARS, NAMELY, THE TWOMBLEY, ROBIE AND PAULMAN

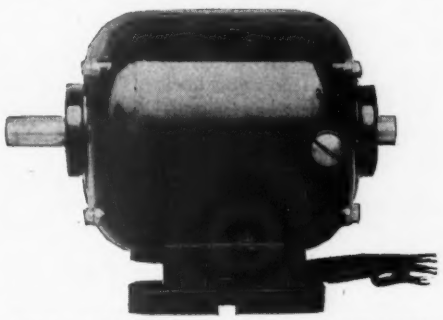
drives, and is not affected by mud or sand. In the Duryea the drive is direct from the motor shaft and rollers of two diameter can be pushed into the grooves, giving the two gear ratios. This has been a feature of the two-cycle buggy type cars of Duryea design for years. Combined with shaft drive from the front this would be applicable to almost any car. It should particularly fit front-wheel drive types of vehicles.

New constructions are being developed. The cyclecar will have a future dependent on the development of these few things fitted peculiarly to the new field, and the makers should study every type to adopt those ideas which will mean the most for the industry.

Gleanings from the Cyclecar Factories

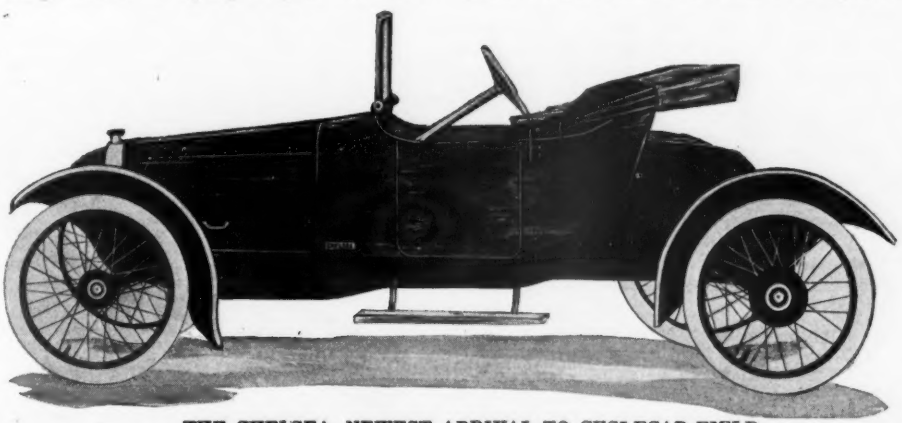
THE Chelsea cyclecar is the newest arrival, this being announced by the Chelsea Manufacturing Co., Newark, N. J. In construction the car is a side-by-side seating light car with a 93-inch cylinder capacity, four-cylinder water-cooled motor, cone clutch, sliding gear transmission, semi-floating rear axle, standard tread and wire wheels. The illustration shows how the car will look, and it is stated that 500 cars will be built this season. The price is stated as $395, but this figure has not been definitely decided upon.

The Steco cyclecar is being developed rapidly, and a large plant at Maywood, Ill., near Chicago, has been equipped to turn out the cars in quantities. Jigs and tools of special description for the job are being finished as rapidly as good workmanship will allow and cars will be ready for delivery soon.



WARD-LEONARD CYCLECAR GENERATOR

The Frederickson cyclecar has undergone a radical change. This car was first made with a 50-inch tread and side-by-side seating. Road experience showed where improvements could be made and as a result a 36-inch tread tandem seater is now on the road. Whereas, the first car made but 30 miles an hour on country roads, it is said that the new car with the same motor can do 55 miles an hour and in greater comfort. Several who have tried near-standard-tread cars have either changed to standard or dropped to 40 inches or less. The Frederickson car is fitted with a very unique two-cycle motor designed by Mr. Frederickson, a motor that runs at very high speeds, cools remarkably, and is very easy starting. The motor is to be offered to the trade for cyclecar use.



THE CHELSEA, NEWEST ARRIVAL TO CYCLECAR FIELD

NEW EUROPEAN LIGHT CARS

The big motor car builders abroad are enlarging their field by producing light cars as a side line. The Peugeot firm has had such success with the Baby Peugeot that other big firms are bringing out cars of similar size and displacement. The most recent is the famous Clement-Bayard firm, Paris, France.

The car is a side-by-side, as are most foreign machines, and sells for about $800. the motor is a four-cylinder block type rated at 7 horsepower, but really giving about 12. The cylinders are 55 by 100 millimeters or 2.17 by 3.94 inches. Ball bearings are used on the main motor shaft, which is of the two-bearing type.

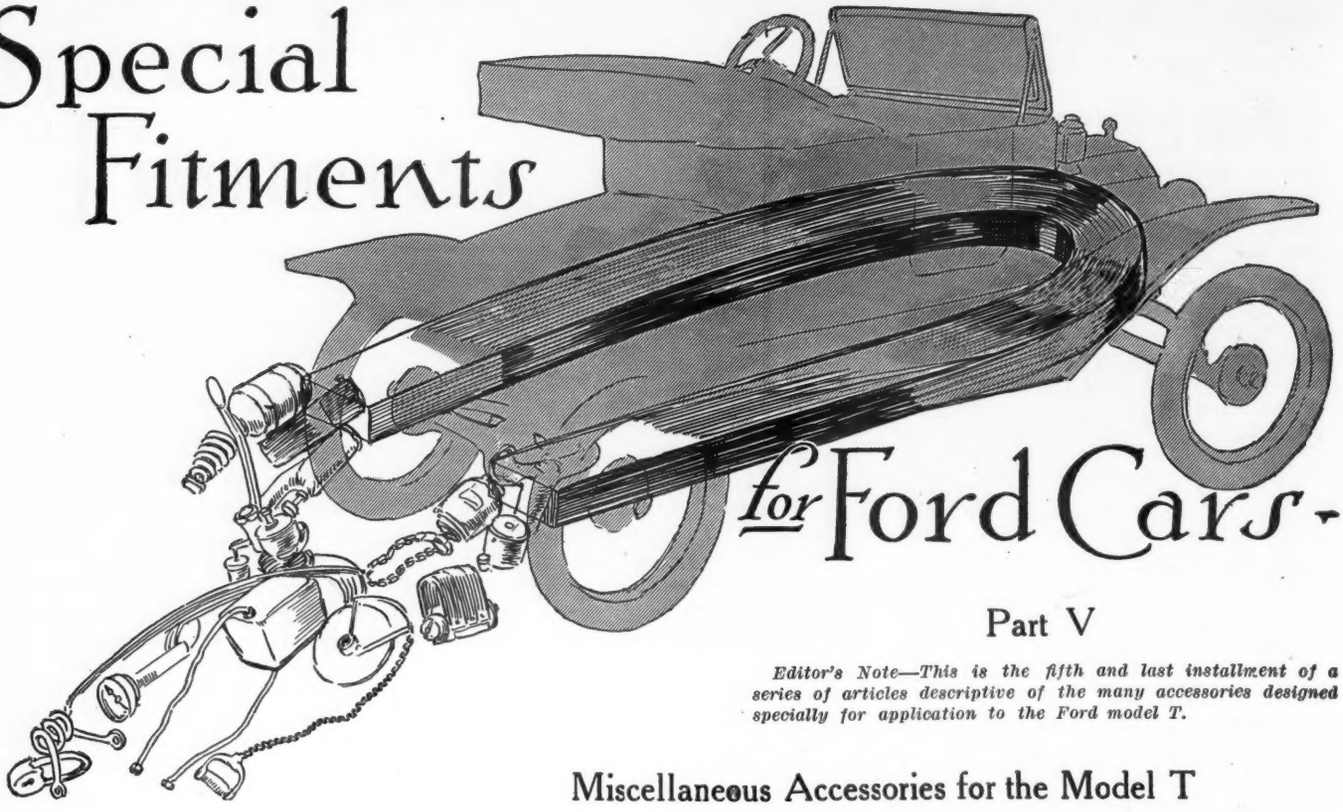
The car has a 45-inch tread and a 94-inch wheelbase, dimensions unfitted for America. It would be very interesting to study the piston and ring constructions used on these small motors and to have data on the life of rings. By the use of steel rings it is claimed that no ring trouble need be had with small bores.

LIGHTING SET FOR CYCLECARS

Satisfied that the new types of light cars and cyclecars will not require more than 5 amperes for a lighting system the Ward Leonard Electric Co. is bringing out a generator of this size designed for cyclecar and light car work. This generator is identical in construction with the larger outfits of 9½ ampere output used on big cars.

The little generator delivers 6 amperes at 1,800 R. P. M., weighs just under 9 pounds and its size is shown herewith, photographed next to a scale. The controller is separate.

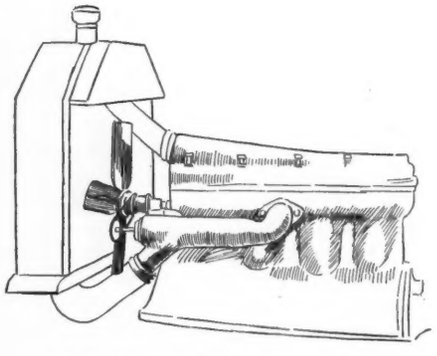
Special Fitments for Ford Cars



Part V

Editor's Note—This is the fifth and last installment of a series of articles descriptive of the many accessories designed specially for application to the Ford model T.

Miscellaneous Accessories for the Model T



FULTON-M'CUTCHAN WATER PUMP

TO insure perfect circulation of the cooling water and thus reduce boiling and frequent refilling of the radiator, auxiliary water circulators may be installed. One of these is marketed by the Fulton-McCutchan Co., Chicago, at $10 ready to install. In place of the hose connection from the jacket to the lower water connection of the radiator is bolted a pump of the spiral type. It is driven by belt from the fan pulley and can be installed without the services of a mechanic. A less expensive one, which comprises a simple two-bladed propeller operating in the lower water pipe and likewise is driven by belt from the fan pulley, is sold at $7.50 by the Pittsburgh Mfg. Co., Pittsburgh, Pa. The circulation increases with the motor speed from 8 gallons per minute at 500 revolutions per minute to 18 gallons at 1,100 revolutions per minute. It is said not to retard the normal thermal circulation.

An engine-driven tire pump is made by the Peerless Accessories Manufacturers, Chicago. It is easily attached to the car, as there is only one hole to drill. It is a single-cylinder pump with 2-inch bore, located permanently under the hood and bolted to the frame of the car. It is driven from the engine shaft by an eccentric and rod. The stud holding the pump to the frame is hollow and has a connection on the outside for the 12 feet of rubber tubing. A rod is run to the front of the radiator to start and stop the pump so that it is unnecessary to raise the hood. It is listed at $7.

A tire pump which can be installed in 20 minutes without the aid of a mechanic, it is claimed, simply by removing the old fan bracket and spindle and mounting the pump in its place, is the Colstad pump. It is a single cylinder pump with a fan belt pulley which replaces the present one, so that the fan belt operates not only the fan but the pump when it is needed. It sells for $7.50 by the Colstad Sales Co., Boston, Mass.

Ford Wheel Puller

An adjustable wheel puller for Ford cars is announced by the Motor Specialties Co., Waltham, Mass. The feature of this puller is that it eliminates the difficulty encountered when the hub threads are too large or too small. Should any variation be found, the puller may be adjusted to fit the threads properly. It is operated similarly to the conventional type of wheel puller. It sells for $1.

Similar wheel pullers are put out by the Benford Mfg. Co., Mount Vernon, N. Y.; by the Auto Parts Co., by Emil Grossman and the American Auto Supply Co. The price is 75 cents and $1. E. Edelmann & Co., Chicago, has a wheel puller at 50 cents.

Accelerators and Signals

Many Ford drivers are desirous of installing a foot throttle to supplement the hand throttle supplied on the car. There are several of these on the market, which can be installed with little difficulty. The one offered by the Excelsior General Supplies Co., Chicago, is listed at $4.50. Another one, which combines with it the function of a "speeder" and economizer by adding extra air to the mixture at high engine speeds, is made by the New York Coil Co., New York, to sell at $5. The Lincoln Machine Shop, Lincoln, Ill., offers foot throttles at $1.50, and the Auto Parts Co. at $3.50.

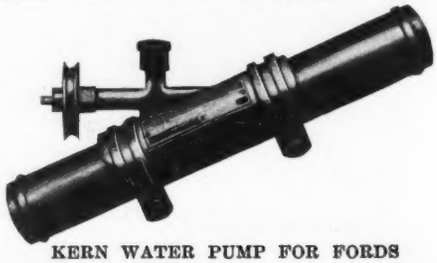
The Peoria Accessory Co., Peoria, Ill., is making a special Ford accelerator designed for quick installation and which sells for $1.50. It is called the Paco accelerator and is designed not to cause excessive wear on the carbureter, mutilate the footboards, or interfere with their removal or with the removal of any of the engine parts. It sets in a proper position for the right foot and is said to be so constructed that it will not tire the foot on long drives.

A similar foot throttle for Fords is marketed by the Fulton-McCutchan Co., Chicago. It is easily installed, requiring no cutting or drilling of any part of the machine. Its operation is horizontal, working on vertical pivots. The price, ready for installation, is $2.50.

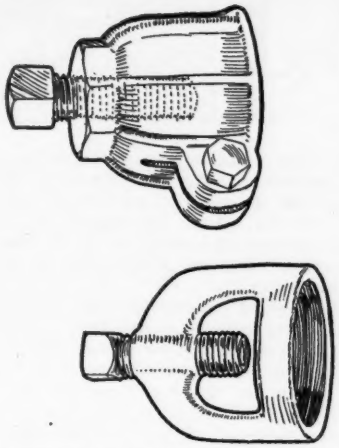
Aside from the electric type the market abounds with exhaust horns, one which is called the Jerico, which is attached to the rear of the muffler and is said not to interfere with the flow of exhaust gas. The Jerico sells for $5 and is made by the Randall-Faichney Co., Jamaica Plain, Mass. Another end-of-muffler type is the Blazer, made by the Motor Specialties Co., Waltham, Mass., and which sells for $3.75. This horn is attached without cutting the exhaust pipe and may be installed in a few minutes.

A new hand-operated signal which gives the tone usually associated with the high-grade electric horns is the Overtone horn manufactured by the Overholt Co., Chicago. It is arranged for remote control. That is, the horn need not be within reach, as it is operated by pulling a cord, which works a ratchet. A short pull of the cable produces a powerful overtone through the winding and unwinding on a small shaft to which is attached a disk having ten small hammers or weights, which in turn are forced against the sounding board of diaphram. It sells at $3.50.

The New York Coil Co., New York, has just placed on the market a new ignition system



KERN WATER PUMP FOR FORDS



TWO TYPES OF FORD WHEEL PULLERS, MOSCO ABOVE AND MONARCH BELOW

called the Uni-coil, designed especially to operate on the Ford flywheel magneto. This system consists of an elevated gear bracket attachment, which is clamped on the end of the Ford engine after first removing the present timer. Bevel gears transmit motion to a vertical shaft running through bracket upon which is mounted a combined timer and high-tension distributor, or as it is termed, synchronizer. All present wiring on the car is removed and by means of a single wire, connection is made to one unit only in the present coil box. A cable runs from the distributing part of the apparatus and is connected to the high-tension terminal of this same unit. The timing circuit operating mechanism within the distributor is almost identical with that employed in regular magnetos.

J. L. Wilson, Magnum, Okla., makes a specialty of installing the model J, K-W magnetos, on Fords. He states that this magneto can be installed very easily by any mechanic and increases the power, speed and economy fully one-third.

Maxim Silencer

Hiram Percy Maxim, inventor of the Maxim silencer for firearms, has developed his idea into a muffler for Ford cars. Maxim has applied the principles to the Ford motor which is so successfully applied on the rifle. The gun silencer kills the report noise and the Ford silencer is designed to kill the exhaust noise. The gun silencer reduces the recoil and the Ford silencer is intended to reduce the back pressure. There is little resemblance between the Maxim silencer and the ordinary muffler.

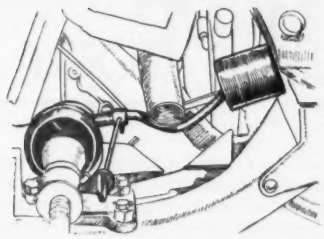
The feature of the silencer is a number of "whirl chambers" formed by using three segments made from $\frac{1}{8}$-inch sheet steel. These are separated from each other at the joints so as to discharge around the circumference. The next chamber, although constructed in the same manner, has its discharge spaces pointing in a reverse direction. Thus is secured a whirl in the space between the two chambers. The noise wave is divided into halves successively until it is gradually dissipated. The silencer occupies the same space approximately and is attached in the same way as the ordinary muffler. It is furnished by the Maxim Silencer Co., Hartford, Conn., at $6.00 complete for quick attachment.

Brake Rod Supports

Brake rod supports which prevent rattling and mis-alignment of Ford brake rods are manufactured by the Auto Parts Co., Providence, R. I. They are made in both steel and bronze and are arranged for quick attachment. The steel ones are listed at $1 per set and the bronze ones at $3 per set.

Belt Holder

The Home Light Co., Chicago, is marketing two specialties for Ford cars, which are of interest. One of these is an anti-slip belt holder, to prevent the fan belt slipping off the pulley. With this holder it is stated the belt need not be tight and consequently it will last longer. It can be applied without removing any part of the motor and sells for 25 cents.



PEERLESS ENGINE-DRIVEN TIRE PUMP

Another specialty is a combination handle and ornament for the radiator cap. It is in the form of the familiar Ford trade-mark and is quite distinctive. It permits easy removal of the cap, even if the radiator is hot, and can be attached by simply drilling a hole in the cap and fastening with the machine screw supplied. It lists at 75 cents.

Coxadjusto

An adjustable shock absorber especially designed for Fords is made by the Cox Brass Mfg. Co., Albany, N. Y., and is called the Coxadjusto. The shock absorber is of the coil-spring type and attaches between the end of the spring and the hanger. The basic principle is a tapered helical spring and an adjustment cap on the top which regulates its tension. The spring is designed so that the large end works under a slight pressure, while the small end comes into operation under severe jolts. The shock absorbers are sold at $10 a pair either for front or rear.

Dominion of Canada Trade Prospects

Makers and Dealers Greatly Encouraged

MONTREAL, June 1—With the passing of the spring season of the year 1914, dealers in motor products see vistas of brightness ahead. Unlucky '13 with its tight money and distressing international eruptions has become a thing of the past. Money is gradually clinking more freely in the pockets of the people. The urge of prosperity is once more visible, especially in the western hemisphere, and nowhere is it more evident than in the Dominion of Canada.

Montreal, as the chief metropolis of the dominion, is the great national thermometer that records this urge. Easy money in the outlying parts of the dominion means a plentitude in the big city. With the loosening of finances comes once again the demand for motor products. That is why local dealers are rejoicing, and that is why an additional spurt in the business of the motor world is anticipated.

Then again, the dominion is waking up and is planning a network of highways over the face of the map that will render conditions much more agreeable to the motorists. More than that, the provinces, each and every one of them, are helping in the movement for better roads, and Quebec is in the van of this movement. The big Canadian and international roads congress just closed is merely an indication, a straw that shows the way the wind is blowing.

Despite the fact that 1913 was not considered one of the brightest 12 months experienced, however, the manufacture and sale of motors showed no decrease. Far from it. On the other hand, gains were noticeable all along the line. Figures for Canada have not been compiled and are not yet available. American export figures serve to strikingly demonstrate that this is the fact.

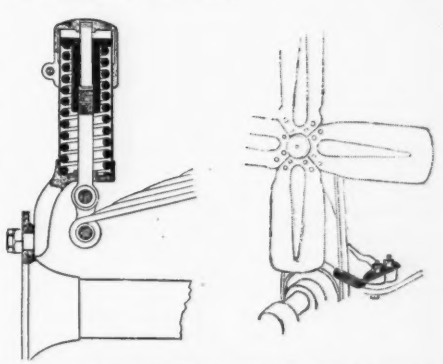
For the 8 months ended with February, 1914, the total value of motor vehicles, engines, tires and parts, and motorcycles was $23,337,732. During the same period the exports amounted to $12,529,844, exclusive of steam locomotives. Adding locomotives brings the total roughly up to $15,000,000. This includes railroad and street car rolling stock, wagons, carriages, aeroplanes, bicycles and tricycles.

Exports of motor vehicles have increased steadily, while imports are decreasing rapidly. For the 8 months' periods ended with February, 1912, 1913, and 1914, were exported respectively 12,347 motor vehicles worth $12,000,000, 14,488 worth $14,852,000 and 16,883 worth $15,716,000. In the same period were imported 717 motor vehicles valued at $1,572,000, 569 valued at $1,329,000 and 230 worth $529,000.

MOTOR TRUCK POLICIES CONSIDERED

New York, June 1—At a meeting of the commercial vehicle committee of the National Automobile Chamber of Commerce held last week a number of matters of importance to motor truck makers, dealers and users were discussed. Foremost among these was standardization of truck design and the danger of proceeding too fast in this direction at the present time.

Wide differences exist in fundamental characteristics between the most successful and widely used makes of commercial cars and an insurmountable obstacle to standardization of such characteristics is the variation in working conditions and the kinds of work the cars are called upon to perform. Standardization of equipment along proper lines, it was agreed, is both desirable and feasible.



LEFT, COXADJUSTO FORD SHOCK ABSORBER; RIGHT, HOME LIGHT FAN-BELT HOLDER

From the Four Winds

OLDFIELD and Beachey Headliners—Barney Oldfield, the veteran racing diver, and Lincoln Beachy, who flies upside down, will be the headliners at a combined motor car and aeroplane race meeting to be held at the Columbus driving park, Columbus, O., June 6 and 7.

Louisville to Stage 100-Mile Race—A 100-mile race will be run July 4 at Douglas Park track, Louisville, Ky. The event is being staged by a syndicate of promoters in which several Louisville men are interested. A sum of $1,000 in cash will be distributed among the winners of the event. The driver of the first car to pass under the wire will receive $500, the driver of the second car $300 and the driver of the third car $200.

Appoints Chauffeur Examiners—Secretary Graves of Ohio has made the following appointments of examiners for chauffeurs under the new law: Columbus, Robert F. Nadig; Cleveland, J. A. LaTour; Dayton, James A. McKenney; Toledo, B. E. McRitchie, and Cincinnati, Horace Williamson. These examiners have been performing their duties for several weeks and so far 2,900 chauffeurs have been licensed in the state.

Another Scenic Route for California—When the Crest road into Bear valley is completed Southern California motorists will have a tour that for scenic beauty cannot be excelled anywhere. The Automobile Club of southern California, through Secretary S. L. Mitchell, has had the route inspected through Waterman canyon and along the crest of the San Bernardino mountains. Over this route the club will erect signs for the guidance of visitors.

Run Stopped by Floods—Impassable roads and flooded rivers in Texas caused the members of the Colorado sociability run, composed of business men of Denver and other points in Colorado, to give up their tour of Oklahoma, Texas and Kansas after reaching Louise, Tex. The tour was finished by train and the members were entertained and banqueted along their return route while they talked good roads and business conditions. They were entertained at Dallas, Tex.; Oklahoma City, Guthrie, Okla., and Wichita, Kan.

Missouri Has Another Good Roads Club—The Missouri Better Roads Federation was organized at a session of most of the motor clubs and improvement associations held at Jefferson City last week. The federation will conduct a campaign for the adoption of the proposed amendment to the state constitution for the levying of a 10 cent tax on the $100 valuation for the benefit of public roads in the state. The amendment, if passed, would yield approximately $2,000,000 each year. The following officers were elected: "Farmer Dick" Jones, Chillicothe, president; A. N. Lindsay, Clinton, secretary, and W. H. Wilcoxsen, Carrollton, treasurer.

Work Soon on National Pike—By the end of May more than 50 miles of the old National Pike, east of Columbus and extending to the Ohio river, will be under reconstruction that will cost more than $1,000,000. This was made certain when State Highway Commissioner Marker and the commissioners of Belmont county fixed the date for awarding contracts for the construction of that part of the road which runs through Belmont county. The cost of this reconstruction will be about $600,000. The county will pay $450,000 and the state $150,000. With Belmont officials in line for the completion of the route across their county, Guernsey county will be the next to fall in line. Everything will be in readiness for Guernsey county as soon as the engineers are able to make an estimate of the cost to determine the necessary bond issue to raise the money. That these road bonds have a ready sale in the markets is proven by the fact that Belmont county received $8,000 premium on the issue of $450,000.

Virginia Counts Its Motor Cars—Virginia now has more motor cars within her confines than ever before in her history, 10,100 licenses for motor cars, exclusive of the special license granted to dealers, having been issued up to May 31. Throughout the state 148 dealers have been issued license tags, which are used on more than that number of cars. During 1913 there were a total of 9,022 licenses issued, and judging from past experiences it is safe to predict that at least 2,000 more licenses will be issued before the end of 1914, bringing the grand total to 12,100. The revenue, however, also has gone ahead of the 1913 income. To date the tax has netted the state $89,292 as against $84,000 during all of the year 1913. It is estimated that the number of licenses yet to be issued will bring the total up to the $100,000 mark.

Coming Motor Events

SHOWS AND CONVENTIONS

June 23-26—S. A. E. summer meeting, Cape May, N. J.
September 26-October 6—Berlin show.
October 17-24—Show, Pittsburgh, Pa.
October 16-26—Paris show.
November 6—Olympia show.
November 9-14—American Road Congress, Atlanta, Ga.

CONTESTS

June 6-7—Track meet, St. Louis, Mo.
June 10-11—Isle of Man road races, Great Britain.
*June 18—Hill climb, Uniontown, Pa.
June 20—Interclub reliability, Philadelphia, Pa.
June 27-July 4—National touring week.
June 29-July 2—A. A. A. National Reliability tour.
June 30—Track meet, Sioux City, Ia.
July 4—French grand prix, Lyons.
*July 3-4—Montamara Festo road races, Tacoma, Wash.
*July 4—Three hundred mile race, Sioux City, Ia., speedway.
July 4—Track meet, Providence, R. I.
July 4—Hill climb, Richfield Springs, N. Y.
July 4—Road race, Prescott, Ariz.
July 17-18—Speedway races, Seattle, Wash.
July 18-19—Speedway races, Seattle, Wash.
August 1 and 3—Beach meet, Galveston, Texas.
July 25-26—Belgium grand prix road races.
August 15—Le Mans cyclecar grand prix race.
July and August—French army truck subsidiary trials.
August 2-9—Six day cyclecar reliability in French Alps.
August 16—Coupe Internationale; light car race, Le Mans.
August 17—Grand Prix of France, Le Mans.
August 21-22—Road races, Elgin, Ill.
September 5—Track meet, Milwaukee, Wis.
September 6-7—Italian grand prix.
September 7—Track meet, Providence, R. I.
September 9—Speedway races, Pomona, Cal.
September 9—Road race, Corona Beach, Cal.
September 14—Track meet, Milwaukee, Wis.
September 18-19—Track meet, Hutchinson, Kans.
October—Gaillon hill climb, Paris.
October 2-3—Track meet, Oklahoma City, Okla.
October 2-3—Track meet, Trenton, N. J.
October 9—Speedway race, Chicago.
November 8-11—Track meet, Shreveport, La.
November 15—Kerosene motor tests, Paris, France.
November—El Paso-Phoenix road race.

* Sanctioned by A. A. A.

Convict Road Is Opened—The new Topango canyon road has just been opened in southern California, following months of labor in the reconstruction of this famous drive. This is the first road to be constructed under the convict system in Los Angeles county.

Another Ohio Motor Club—The Marion County Automobile Club has been organized at Marion, O., and will affiliate with the Ohio Automobile Association. The following board of directors was elected: H. M. Dombaugh, Frank King, Jacob Moore, Done E. J. Brockett, George Whysell, D. D. Clifton, E. K. Uhler, E. Browne and T. J. Pittman. Warren G. Harding was selected temporary president and A. J. Berry, temporary secretary.

New Concrete Highway Proposed—A proposed concrete highway between Chicago and Kankakee is attracting attention among the motorists of central Illinois. The residents of Crete township have appropriated $3,000 as their share of the cost and it is believed that all other townships crossed by the new highway will make a proportionate allowance. The route as laid out starts in Kankakee and goes through the towns of Manteno, Peotone, Goodnow and Crete. From the latter point north, there are macadamized roads nearly all of the way into Chicago. The state has agreed to care for this road when completed.

Tires by Parcel Post—Motor car tire dealers have reason to be happy over a ruling announced by the post-office department that tires may be sent by parcel post. It will facilitate the delivery of tires to individuals out of town. The ruling specifies how the measurements of tires are to be taken in accord with parcel post regulations. In measuring tires merely wrapped, with an opening space in the center, the outside diameter shall be considered the length and the circumference of the tubing as the girth. In measuring tires packed solidly without clear space in the center, the diameter of the parcel shall be considered the length and twice the diameter and thickness as the girth.

Name Winners in Saxon Contest—Final revised reports on the 200-mile non-stop contest for Saxon dealers throughout the country show an economy average of 34.53 miles to the gallon of gasoline. This is slightly less than the average of 34.75 miles, compiled from the first batch of telegraphed statements. The winners, according to President H. W. Ford of the Saxon Motor Co., were the Diamond Motor Car Co., of New Rochelle, N. Y., with a record of 47.05 miles to the gallon, and the Iowa Automobile and Supply Co., of Des Moines, which made a record of 47.0. miles to the gallon. Among others who scored remarkable averages were the Davis Auto Co., Providence, R. I., with a score of 44.4 miles to the gallon; L. A. Van Patten, of New York, 44 miles; M. H. Wood, of Webb City, Mo., 40.7 miles; H. C. Steinau, Bronx, N. Y., 40.1 miles; Thompson & Smith, Bakersfield, Cal., 40 miles; Thomas J. Doyle, Detroit, 40 miles; Northwestern Auto Co., Minneapolis, 40 miles; Western Motor Car Co., San Diego, Cal., 40 miles; Jamison & Hallowell, Montgomery, Ala., 39.4 miles.

Among the Makers and Dealers

GILLARD Leaves Pullman Company—E. T. Gillard, connected with the Pullman Motor Car Co. for the last 5 years as chief engineer, has resigned.

Add $100,000 to Capital Stock—The capital stock of the Star Rubber Co., Akron, O., has been increased from $250,000 to $350,000.

Truck Company Enlarging Plant—The Four Wheel Drive Auto Co., Clintonville, Wis., has broken ground for another addition to its plant which will be known as unit six and used as a paint shop.

Marketing New Traffic Signal—E. S. Adams, head of the E. S. Adams Co. of Columbus, O., has placed on the market a traffic signal to be attached to the windshield of motor cars to enable the drivers to signal the way a turn is to be made. The signal is raised and locked by one operation and is said to be quite simple.

Plan Addition to Allen Factory—The Allen Motor Co., of Fostoria, O., contemplates the erection of a large addition to its plant on the site of the Atlas Mfg. Co., located just across the street from the present plant. Application has been made to the city officials for permission to build a covered passageway across the street and if that is granted, the addition will be started at once. The company plans to build 2,000 cars next year.

Costly Fire at Dayton Plant—Spontaneous combustion is given as the cause of a disastrous fire in the machine shop of the Apple Electric Co., of Dayton, O., which caused a loss of $100,000 recently. Only about 80 per cent of the loss is covered by insurance. The plant was completely ruined and officials say a new plant will be built at once.

Sells Spring Business to New Company—The Alloy Steel Springs Co. is the name of a newly organized concern which has taken over the spring department of the Lewis Spring and Axle Co., Jackson, Mich. Fred Keiser, vice-president of the latter concern, heads the new company which has Casper Haehnie as its vice-president and A. L. Wuster as secretary and treasurer. By this action the Lewis company discontinues the manufacture of springs but will still make all its other products for the motor car trade.

New Plant for Carter Company—The Carter Carbureter Co., St. Louis, Mo., whose present factory is located at 912-914 North Market street, has just bought the large modern factory located on Spring avenue, between St. Louis and Dodier avenues, formerly occupied by the Carruthers-Jones Shoe Co. The main building is of brick, three stories, 125 by 50 feet, and another building 40 by 90 feet will be put up at once, with additional buildings as needed, the purchase including ample space for expansion. The Carter company expects to remove to the new plant about July 1.

Goodyear Cuts Block Tire Prices—The Goodyear Tire and Rubber Co. has announced a reduction of approximately 5 per cent in the price of its individual block motor truck tires. A truck owner can now buy a block tire at the same price he would have to pay for a demountable or pressed-on tire. Two of the most popular sizes in this type of truck tire are the 36 by 5 and the 36 by 6. The former size has come down 5.7 per cent, the new price being $118.47, while the former price was $125.62. The latter size has come down to $147.62, or approximately 9 per cent, the former price being $157.94. According to advice received from the factory at Akron, this was made possible by the constantly increasing demand for this type of tire by the truck operators. Raising the production volume lowered the cost to an extent sufficient to warrant a decrease in selling price.

Goodspeed Chief Engineer of Moon—L. F. Goodspeed has joined the forces of the Moon Motor Car Co. and is now in charge of the St. Louis plant as chief engineer. He succeeds George F. Heising, who has been promoted to purchasing agent of the company.

Studebaker Shipments to London—A Canadian Pacific steamer, which recently cleared from St. John, carried 214 Studebaker motor cars for distribution by the corporation's London branch. During February, Studebaker shipped an average of forty cars daily to foreign ports.

Top Company Makes Assignment—The Sprague Umbrella and Mfg. Co., of Norwalk, O., maker of motor car tops and other accessories, has made an assignment for the benefit of creditors with $10,000 assets and $60,000 liabilities. E. G. Martin was appointed assignee.

May Move to Beaver Dam—The Kerosene Power Co., Minneapolis, Minn., manufacturing a line of kerosene engines of the stationary and marine type, and now developing a kerosene motor suitable for commercial cars, has made a proposition to the Commercial Club of Beaver Dam, Wis., to relocate its plant if suitable manufacturing quarters are provided and Beaver Dam capital can be induced to take a small block of stock. The proposition is receiving serious consideration, inasmuch as there is a suitable factory now idle and on the market. A campaign is under way to secure subscriptions to $30,000 worth of the stock. The Minneapolis corporation is capitalized at $100,000.

Cox Joins Dodge Bros. Co.—George H. Cox, who has been connected with the motor truck department of the Willys-Overland Co. at Toledo since last February, has resigned, and will enter the employ of Dodge Bros. Co., Detroit, assisting A. I. Philp in the sales department.

Anderson with Stutz Company—Harry W. Anderson of Atlanta, Ga., who for over 3 years past has represented the American Motors Co. in the south, has been appointed assistant sales manager of the Stutz Motor Car Co., and has already taken up his duties in connection with his new position.

Thomas and Columbus to Unite—The announcement is made by the new purchasers of the Columbus Buggy Co., of Columbus, O., that the plant of the E. R. Thomas Motor Co., of Buffalo, will be removed to Columbus and united with the Columbus Buggy Co. The Buffalo plant employs about 250 men and it is said the greater part of the skilled mechanics will move to Columbus.

Daniels with Prest-O-Lite Co.—Bruce Daniels, advertising manager of the Stutz Motor Car Co., Indianapolis, Ind., has resigned to accept a similar position with the Prest-O-Lite Co., Indianapolis. Mr. Daniels, previous to his connection with the Stutz Motor Car Co,. was connected with the Motor Car Mfg. Co. of Indianapolis.

Recent Incorporations

Albany, N. Y.—Knapp Motor Corp., capital stock $10,000; incorporators, E. B. McKellar, T. C. Jenkins, H. L. Hughes.

Albany, N. Y.—Motor Truck Garage, capital stock, $50,000; incorporators, H. B. Embler, H. J. Benjamin.

Albany, N. Y.—Shirley Auto Fabric Co., capital stock, $10,000; incorporators, M. A. Shirley, E. J. Shirley.

Binghamton, N. Y.—Binghamton Automobile & Supply Corp., capital stock, $110,000; incorporators, F. E. Spawn, C. J. Phillips, D. C. Herrick.

Boston, Mass.—Metropolitan Garage, capital stock, $10,000; incorporators, A. Schiavina, A. L. King, M. W. Melrose.

Boston, Mass.—Bantam Mfg. Co., capital stock, $200,000; to manufacture motors; incorporators, F. J. Tyler, L. S. Tyler, A. P. Teele.

Brooklyn, N. Y.—H. & H. Harahe Co., capital stock, $10,000; incorporators, C. Higley, R. M. Hart, B. M. Hart.

Buffalo, N. Y.—Pat Toal, motor car business; capital stock, $5,000; incorporators, P. A. Toal, D. M. Hepburn, P. P. Barton.

Cincinnati, O.—U. S. Gas Governor Co., capital stock, $10,000; to manufacture gasoline apparatus; incorporators, A. P. Best, E. W. Patchell, A. J. Koehle, W. H. Best, S. K. Proctor.

Cincinnati, O.—Hunter-Dammel Motor Car Co., capital stock, $5,000; to deal in motor cars; incorporators, J. H. Hunter, A. W. Dammel, H. Koppitke, J. L. Meyer, L. H. Nathan.

Cleveland, O.—Brown Middlewest Tube Co., capital stock, $10,000; to deal in motor car supplies; incorporators, M. O. Smith, G. W. Jacobs, F. S. Martin, M. P. Goodman, R. Fraser.

Cleveland, O.—Commercial Truck Co., capital stock, $25.000; to deal in motor cars; incorporators, P. S. Crompton, F. B. Fults, G. W. House, C. R. Brown, H. Davis.

Columbus, O.—Columbus Oil Co., capital stock, $20,000; to manufacture and deal in oils; incorporators, C. A. Laubach, C. Laubach, W. T. Trimble, J. H. Trimble, H. Steick.

East Liverpool, O.—Liverpool Motor Car Co., capital stock, $10,000; to deal in motor cars; incorporators, C. R. Larkin, S. J. Norton, H. A. McClain, M. Camards, A. G. Ellis.

Elyria, O.—Guarantee Oil Co., capital stock, $10,000; to manufacture petroleum; incorporators, G. H. Lewis, A. D. Ely, G. H. Thomas, G. H. Marsh, C. T. Lersch.

Indianapolis, Ind.—Moross Amusement Co., capital stock, $10,000; incorporators, E. A. Moross, M. Moross, W. S. Bennett.

Kittery, Me.—Secondary Combustion Process Co., capital stock, $100,000; incorporators, G. H. Gray, F. W. Manson, H. Mitchell.

Louisville, Ky.—Sampson Engineering Co., capital stock, $350,000; to manufacture starters; incorporators, B. N. McGraw, D. A. Caldwell, N. H. Wright.

Montreal, Que.—Detroit Electric Motor Co., capital stock, $20,000.

New York—Atlas Automatic Jack Corp., capital stock, $250,000; motor car accessories; incorporators, C. Presbrey, J. F. A. Comstadt, E. M. Raynor.

New York—Eckert Carburetor Co., capital stock, $5,000; incorporators, C. A. Terrell, F. E. Hanabray, T. H. Murphy.

New York—Indiana Commercial Truck Corp., capital stock, $10,000; incorporators, H. H. Lawson, S. M. Richardson, M. Ely.

New York—Powers Shock Absorber Co., capital stock, $10,000; incorporators, P. Powers, J. Lange, F. G. Hurst.

New York—Central Auto Supply Co., capital stock, $5,000; incorporators, P. Gorman, T. C. Gorman.

Norfolk, Va.—Brodrick-Glennan Corp., to conduct agency; capital stock, $10,000; incorporators, W. S. Brodrick, M. Glennan.

Roanoke, Va.—White American Locomotive Sander Co., capital stock, $75,000; to deal in motor vehicles; incorporators, W. H. White, J. Frantz.

Rosslyn, Va.—Rosslyn Garage, capital stock, $5,000; incorporators, R. G. Finney, C. R. Pritchard.

Sidney, O.—F. X. Lauterbur Co., capital stock, $10,000; to open repair shop.

Springfield, Mass.—Knox Motors Co., to deal in motor cars; capital stock, $2,500,000; incorporators, E. O. Sutton, H. G. Fisk, C. H. Beckwith.

Toledo, O.—Rupp-Skeloon Motor Co., capital stock, $50,000; to manufacture and deal in motors; incorporators, R. G. Young, J. Nye, J. Greenwald, B. Young, B. W. Johnson.

Trenton, N. J.—Automobile Tire Cooling Co., capital stock, $125,000; incorporators, S. Ball, A. Linsdley, C. C. Leonard.

Warren, O.—Auto-Test Co., capital stock, $20,000; to manufacture and deal in motor car supplies; incorporators, F. I. Spellman, H. E. Vaughan, H. G. Paden, F. W. Andrews, C. S. Vaughan.

Waterville, Me.—Lombard Tractor Co., capital stock, $250,000; incorporators, S. W. Lombard, A. O. Lombard, J. E. Nelson.

Xenia, O.—Xenia Rubber Mfg. Co., capital stock, $40,000.

The Motor Car Repair Shop

Remedies for Clutch Troubles

IT occasionally happens that a car is brought into a repair shop with a complaint that the clutch slips in starting, takes hold too slowly, etc. When a disk clutch of the running-in-oil type begins to slip, the trouble generally is due to maladjustment, too much oil, or an oil of too heavy a grade. To treat a slipping clutch of this kind one should turn the flywheel over until one of the oil plugs can be removed; pour in about a pint of kerosene oil; replace the plug, then have some one turn the engine over very slowly while the clutch is worked in and out for a few minutes. In this way the kerosene comes in contact with all of the internal mechanism of the clutch, and letting the clutch in and out forces the kerosene in and out between the plates or disks, cleaning away the thick and sticky oil. Some repairmen endeavor to clean the clutch in the above manner, but instead of turning the motor over slowly by hand while the clutch is being worked in and out, they do it while the motor is running, ignoring the fact that as the clutch revolves at speed the oil is held to the sides of the case and therefore does not flush the plates as it should. This method, however, will meet with fair success if a sufficient quantity of kerosene is used. After the clutch has been thoroughly flushed, drain off the oil and kerosene, flush out if necessary with a few gunfuls of gasoline, then refill with the required amount of a mixture of kerosene and cylinder oil.

Another cause of clutch slippage is the glazing of the disks. This occurs more frequently with dry-plate types, but the disk-in-oil clutches are not entirely free from this trouble. In fast running with frequent manipulation of the clutch, the bulk of the oil is forced off of the clutch by centrifugal force, and what remains is rapidly burned by friction, forming a hard impervious glaze of carbon, which greatly impairs the adhesion of the disk surfaces. When this condition obtains, mere flushing out with kerosene will not suffice, for although kerosene will cut the glaze to some extent, it will immediately harden again, if it is not removed.

To remedy this, after the old lubricant has been thoroughly cleaned out, the motor should be run at moderate speed, and with the gears in mesh, and the hand brake set, the clutch worked in and out, almost stalling the motor at each partial engagement. This will rub the carbon loosened by the kerosene off the disk faces, and centrifugal force will carry it away.

Making Gaskets

The gaskets between the bases of the cylinders and the crankcase and similar joints generally are made by stretching drawing paper or wrapping paper over the base of the cylinder, and while holding the paper firmly in place with one hand, operating a ball peen hammer as shown in Fig. 1. The round end of the hammer should be employed in this process, and the gasket is cut out by lightly tapping the sharp edges of the cylinder base through the paper. This method is often employed in making gaskets for aluminum parts but results in damage to the casting if one is not careful. Aluminum is soft and the edge may be broken down.

To make a gasket for an aluminum case, the paper should be pressed over the bolt holes and edges of the case so that an impression is made that can be seen easily; the gasket then can be cut out readily with a pair of scissors or a knife in much less time than would be required to do it with a hammer. Grease should be spread over the aluminum before the paper is applied so as to make the paper stick to the metal. Lead, copper and asbestos gaskets for flange connections of the manifolds can be made easily with a peening hammer as paper gaskets are made. In making gaskets from wire asbestos sheet packing, the hammer cannot be used to advantage, and it is better to cut them out with a pair of tin-snips or an old pair of shears.

Determining Oversize Tires

Determining the oversize for a certain tire is a simple matter and may be done mentally. A concrete example explains the method best. A 34 by 4-inch tire has 4 inches of tire on two opposite sides of the wheel, making the total tire thickness 8 inches. This subtracted from the diameter of the tires gives 26 inches as the wheel diameter and the inside tire diameter. Any other tire with an inside diameter of 26 inches will fit the same wheel. A 35 by 4½-inch tire has 9 inches total thickness and this subtracted from 35 gives 26 inches for the necessary wheel diameter, hence a 35 by 4½-inch tire is the oversize for a 34 by 4. In all cases, then, subtract twice the tire cross-section from the tire diameter to get the wheel size or inside tire diameter.

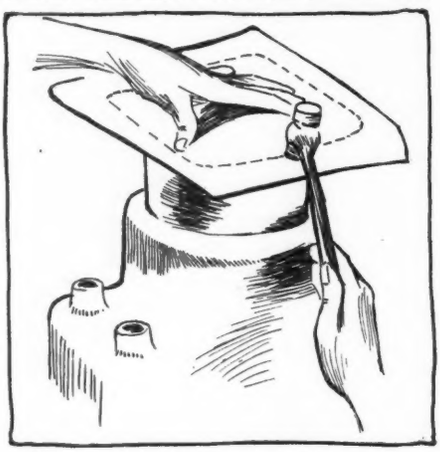


FIG. 1—MAKING GASKETS

Wrapping paper is stretched over the surface and while the paper is held firmly a hammer is used to lightly tap the sharp edges of the part. The work is made easier by first spreading a little grease over the surface and then applying the paper. In this way the paper sticks to the metal and a definite outline may be seen.

Some Tire Hints

When there is no cement at hand a good adhesive is made by dissolving small pieces of old rubber in gasoline or benzine. When on the road it is sometimes a difficult matter to obtain small pieces of rubber and in an emergency, especially at night, some motorists resort to the method of cutting small pieces from an extra casing. This should not be done, however, unless there is no rubber tubing or other rubber parts about the car.

A slow leak caused by a pin hole puncture in the tube is rather difficult to find for the escaping air is hardly felt by the hand or face; if the tube is turned around in some fine dirt on the road the air escaping from the tube will blow the dust slightly and one can tell easily the approximate location of the hole.

At this time of the year, many car owners underinflate their tires and then figure on the heat generated in the tire to bring the pressure to the normal point. Although correct in theory, that is, the pressure will be increased, it has proved unsuccessful in a number of instances brought to the attention of the writer. The temperature of the air in the tire rises and hence the rubber becomes hotter and wears more rapidly. In a test run made by a Chicago dealer the rubber became so hot that the hand could not be held upon it for any length of time, comfortably. Underinflation of tires should not be practiced under any circumstances. If, on hot days, the tires are pumped to the proper pressure, less heat will be generated in the casing and less wear will result. Then again, when the car is standing over night in the cold air, the pressure drops and if underinflated originally, the morning will see a tire which may blow out after being stone bruised or run against the curb.

The proper tire pressure varies with the different makes of tires and generally is from 18 to 20 pounds per square inch of cross-section. Thus, a 4-inch tire should be inflated to 80 pounds pressure. Have your tire gauge checked against a standard, for the one you are using may be as much as 5 pounds out for every 50 pounds. Don't be afraid to pump too much.

IN THE END

The racing record of a carburetor means little to the every day car user.

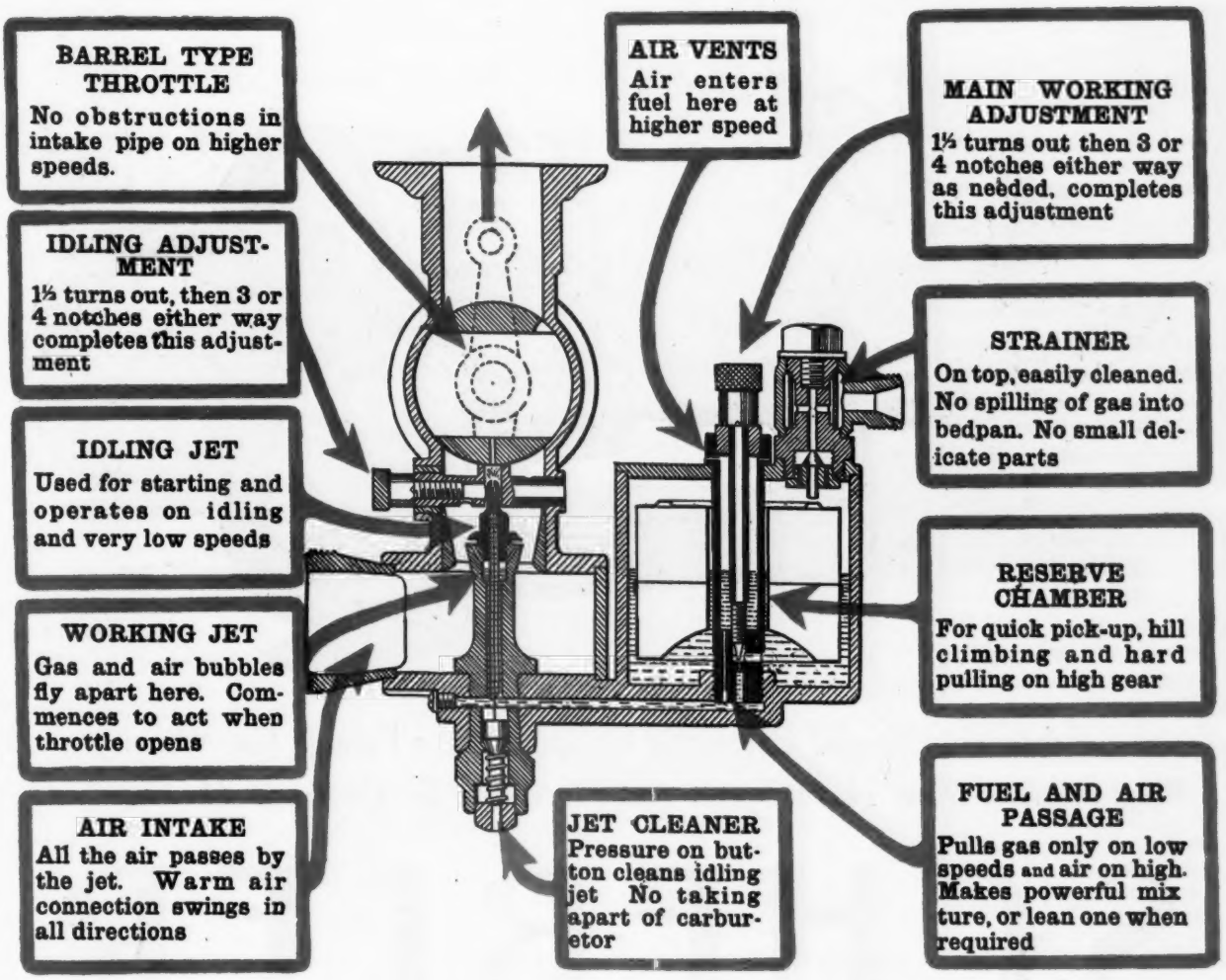
We can fill pages with racing records gathered in 20 years.

We can fill volumes with records of consistent performance of the LONGUEMARE CARBURETOR on cars in every day use.

The economy test made by the French Military Commission with a LONGUEMARE, creating a record of .455 lbs. per B. H. P., still stands unequaled.

Twenty years' experience in carburetor building has taught us what to avoid.

We discarded springs, balls, cams, sleeves, auxiliary air valves, and other trouble breeders years ago.



There is none easier to adjust and once set no changing required during the life of the car.

Only the throttle, float, and float pin move—THERE ARE NO VITAL WEARING PARTS.

Patented in France (S.O.O.G.), Germany (D.R.P.), Great Britain and other foreign countries.
U. S. Patents both granted and pending.

Responsible representatives wanted—Write for catalog

LONGUEMARE CARBURETOR CO.

246 West 59th Street, NEW YORK

When Writing to Advertisers, Please Mention Motor Age.

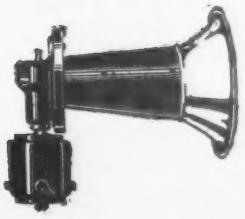
Klaxon Service

from another standpoint

"I FIND it requires but little or no attention to keep a Klaxon in good shape. Mine is now on its *third car*—50,000 miles. Your "Service" is a courtesy. Don't consider it a necessity. A child almost could take care of a Klaxon.

"You repaired my horn at cost of express-age one way. That's good enough service for anybody."

from W. WEST RANDALL, ESQ.
care The Automobile Club of Philadelphia



LOVELL-McCONNELL MFG·COMPANY
Makers of the "KLAXON"· Newark, N·J·

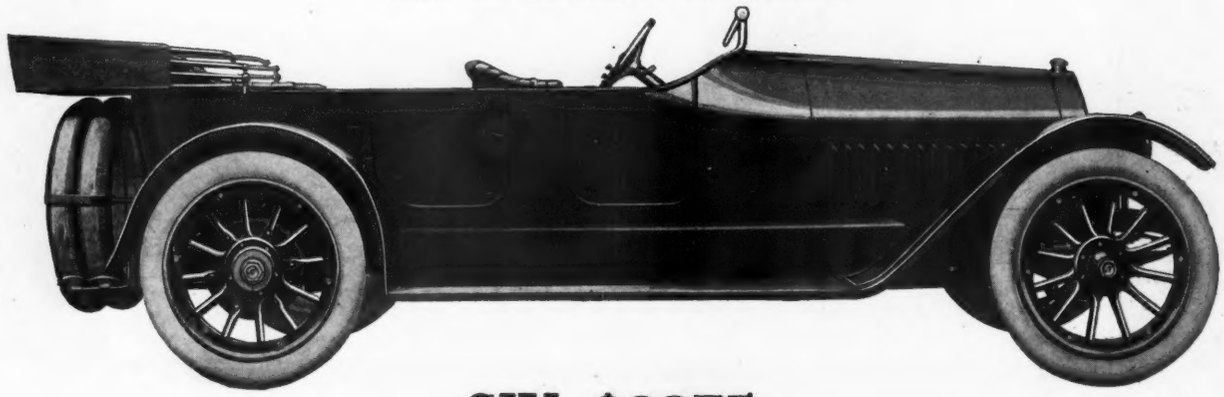
This advertisement planned, written and set up entirely in the Klaxon Factory. Type composition by the Klaxon Press with "Klaxon" type especially designed by Goudy.

National

Champion American Car

Still holds record for fastest time in all four of the 500-mile races for American made cars. No American car has equaled, let alone surpassed, the National's performance in 1912. National not entered since then.

Write for Illustrated CATALOG



SIX $2375

National Motor Vehicle Co., Indianapolis, Ind.

Building World's Stock Car Champion

When Writing to Advertisers, Please Mention Motor Age.

Did You Ever Tell the Drug Man Where to Go

When he tried to foist upon you some nostrum of his own instead of the reliable remedy you asked for?

If you haven't, you've felt like it.

When you go to buy a certain automobile the dealer can't reach up to a shelf and hand you down another of his own make which he claims is "just as good."

But some few manufacturers equip their cars with cheap accessories and try to sell them in competition with those you know are reliable and whose makers have spared no expense to produce the best in construction and appointments.

Look to the accessories—if they are cheap, look out for the car itself—it's skimped somewhere.

No accessory on a car is of more importance than the storage battery.

ELBA

TRADE MARK REGISTERED

Storage Batteries

Are the Choice of the Great Majority

If the car you are offered does not contain an ELBA battery and the dealer tells you another is "just as good," you tell him the same as you want to tell the drug man.

He knows better just the same as do the makers of nearly all cars, big or little, who have tested, proven and adopted the ELBA.

Insist on an ELBA and you will get it.

Your dealer won't lose a sale for the sake of furnishing another battery which costs him a few dollars less.

ELBA **Willard Storage Battery Co., Cleveland, Ohio** ELBA

New York Branch: 136 W. 52nd St.
Chicago Branch: 2241 Michigan Ave.
Detroit Branch: 736-740 Woodward Ave.
San Francisco Branch: 821 Monadnock Bldg.
Indianapolis Branch: 318 North Illinois Ave.

SERVICE STATIONS IN ALL PRINCIPAL CITIES IN THE UNITED STATES, CANADA AND MEXICO (103)

ROMORT Guaranteed Auto Specialties

MR. JOBBER
MR. DEALER
MR. GARAGE MAN
MR. VULCANIZER
MR. OWNER

Romort Guaranteed Auto Specialties will interest you. **Nothing on the market "just as good"—they are the best.** Mr. Jobber, if you are not cataloguing the Romort line we invite you to write us. Mr. Dealer, if your jobber cannot supply you, write us direct. Mr. Garage Man, Mr. Vulcanizer, Mr. Owner, we solicit your business through any up-to-date dealer. If your dealer is a dead one, don't wait—fill out the coupon below, your order will have our prompt attention.

Romort Straight Pump Connection

PRICE $0.40 EACH

Full Size Cut.

This is the best air connection for use of hand and foot pumps, power tire pumps, etc. Solid casting will last a lifetime. **Holds fast to tire valve. Will not blow off.** Up to date dealers carry them in stock. If your dealer can't supply you, don't take a substitute. Fill out coupon below. See that "Romort" is stamped on the valve and gasket.

Romort Air Nozzle

(Cushion Cleaner)

PRICE $0.35 EACH

For blowing dust and dirt off of Automobile cushions, etc. **Attached to Romort Valves or Connections air flows out of needle point with terrific force, making a perfect air cleaner.** Leading dealers, or fill out coupon below. There is nothing "just as good."

Romort ANGLE PUMP Connection

PRICE $0.60 EACH

For direct connected air systems where storage air is not used, this connection has no equal. Solid casting with center pin—will wear for years. **Holds fast to tire valve.** Fits any size tubing. Your dealer has them or fill out coupon below.

Romort Automatic Air Valve

PRICE $3.00

PRICE LIST OF PARTS
See Letter on Cut

a—Body	$1.50	each
b—Nut	.40	"
c—Spring	.05	"
d—Plunger	.50	"
e—Gasket	.05	"
f—Cap	.50	"

The ideal Connection for Storage Air Systems. Fits any size tubing. Absolutely automatic in opening and closing. **It is impossible for the user to waste air. Built for service, severe abuse does not hurt it. Thrown on the cement walk, or run over by the car does no damage. Economical, the first cost is usually the total cost. We guarantee to replace the valve or any part (except the rubber) if worn out or unsatisfactory within one year from date of purchase.** This valve is catalogued and carried in stock by most of the leading Jobbers and Dealers in the United States and Canada. **If your dealer can't supply you, don't wait—fill out coupon below.** See that "Romort" is stamped on the Valve and Gasket.

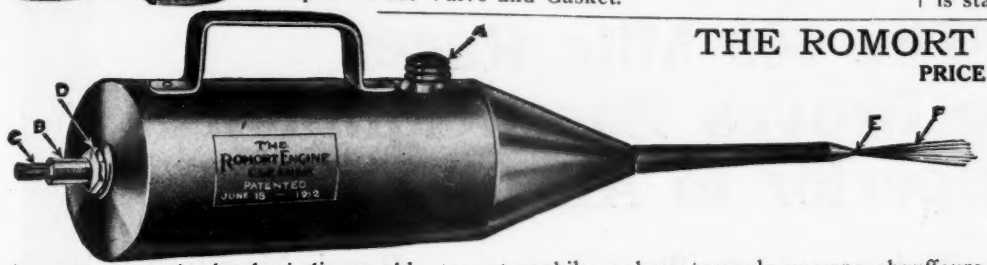
Romort Pump Connection Rubber

PRICE $0.30 PER DOZEN

Far superior to the old style rubber. Will fit all pump connections. **Romort design—Romort Compound. Will not turn inside out or blow off. Made to wear longer and give better service.** Romort Rubbers are put up in cartons of one dozen rubbers each. Carried in stock by all up-to-date dealers, or fill out coupon below. See that "Romort" is stamped on the rubber.

THE ROMORT ENGINE CLEANER

PRICE $3.00 EACH



Avoid the Danger

Of Explosions, Fires, Worn Parts, Short Circuits and Fatal Accidents Caused Directly by the Accumulation of Dirt and Grease—Use The Romort Cleaner.

An accessory absolutely indispensable to automobile and motorcycle owners, chauffeurs, garage and repair shops. **Sustains your car efficiency by keeping the machinery bright and new.** Cleans the engine and machinery perfectly without the use of rags, waste or brush. Designed for the special purpose of cleaning automobile and motorcycle engines and machinery, it is constructed with a long spout or point, so the operator may easily reach every nook and part of the machinery, an impossibility with the old method of rags and waste. **The dirt and grease readily disappear before a strong spray, which works under very low air pressure.** Use a foot-pump, air bottle, engine driven or spark plug pump garage storage systems or in fact any air pressure system from 10 pounds to 200 pounds. It cleans the machinery of your automobile or motorcycle just as readily and with the same result as one would hose off the outside of the car. **The Romort Engine Cleaner, one quart of coal oil and five minutes of your time will do the work.**

DESCRIPTION—The Romort Engine Cleaner is 20½ inches long by 4 inches in diameter, a convenient size for carrying in a car. Fluid capacity, two quarts (common coal-oil preferred); this quantity is sufficient to clean the largest Engine. Weight 1¼ pounds. Construction is very simple, there being absolutely nothing to wear, or get out of order. Finish, black.

HOW TO OPERATE—Fill the tank as shown in the cut at letter "A," attach the cleaner to hose or air supply at letter "C" (standard connection will fit any air hose). Turn knurled rod at letter "B," which opens valve and lets fluid out at letter "E," fluid is forced out in a very strong spray, as shown by letter "F." **Light or heavy spray is regulated** by a slight turning of knurled rod "B." The packing nut, as designated by letter "D," may be easily detached and repacked if found necessary.

NO DANGER OF EXPLODING—As the air does not enter the tank, but passes right through, picking up the fluid at letter "E," there is absolutely no danger of the tank blowing up—this being impossible.

Carried in stock by all leading dealers—or fill out coupon below.

The Romort Valve Company

Mfrs. Guaranteed Auto Specialties **701 E. Pike St., Seattle, Wash.**

Canadian Address—807 PENDER ST. WEST, VANCOUVER, B. C.

The Romort Valve Co., 701 East Pike St., Seattle, Wash.
Gentlemen: Enclosed please find ..... Dollars, for which please send me by Parcel Post or Express prepaid, subject to your guarantee .....
Name .....
Address .....

$250.00 IN GOLD FOR IDEAS

We are going to give $250.00 in gold to mechanics, or to any other persons understanding mechanical matters, for the best reasons, expressed in 500 words or less, why the high speed, high efficiency, light weight type Jeffery motor in a car like the Jeffery Four is best suited to the present day demands of the American motoring public for economy, quality and durability.

An Opportunity for Everyone of a Mechanical Turn of Mind

We wish to embody in our advertising the best ideas of the best mechanics in America as to why the Jeffery Four equipped with this type of motor must eventually dominate the medium-price car field.

We have our own ideas as to the superiority of the Jeffery Four motor. Automobile papers throughout the country have their ideas as to the supremacy of this type of motor. What we want now are your ideas—the ideas of repairmen, garage mechanics, dealers, chauffeurs, motorists, anyone.

It makes no difference what language or phraseology you use. WHAT WE WANT IS THE IDEA. Your chance of winning is consequently just as good as if you were a college graduate.

The prizes will be distributed according to the judges' decisions as follows:

1st Prize—Best Answer	$100
2nd Prize—Best Answer	50
3rd Prize—Best Answer	25
4th Prize—Best Answer	25
5th Prize—Best Answer	20
6th Prize—Best Answer	15
7th Prize—Best Answer	10
8th Prize—Best Answer	5

The conditions of the contest require that contestants give their full name and address, as well as their present connection.

Contest Closes July 1, 1914

The judges are all of high standing and national reputation. They are:

F. E. EDWARDS, Chairman Technical Committee Chicago Automobile Club

F. J. WAGNER, Starter Vanderbilt Cup Races

C. G. SINSABAUGH, Editor Motor Age

NOTE—Information regarding the details of Jeffery construction will be sent upon application

The Thomas B. Jeffery Company

Main Office and Works, Kenosha, Wisconsin

KISSEL-KAR

PAIGE-DETROIT

NOW SUPPLIED FOR EVERY

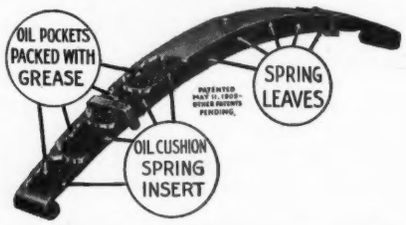
HUDSON

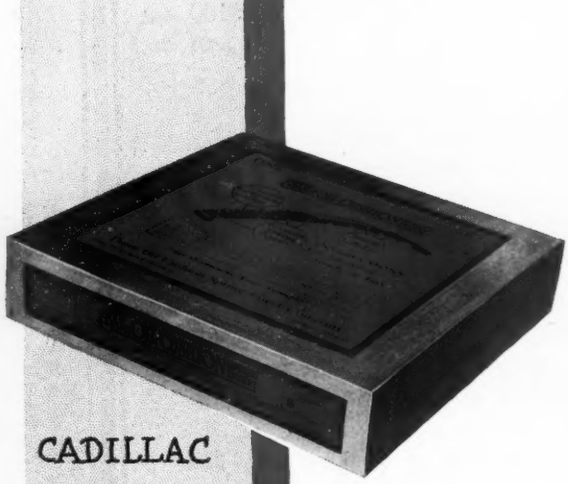
We are now prepared to supply DANN Insert ready packed in boxes, and ready for immediate installation between the spring leaves of any make of car, from the Abbott-Detroit down the list to the Winton. The boxed Insert comes in different lengths adapted to the springs of the different makes of cars.

The DANN OIL CUSHION SPRING INSERT

"The Insert of 10,000 Oil Pockets"

Motorists who are unable to get DANN Insert from their dealer can now order the boxed Insert direct from our factory.





CADILLAC

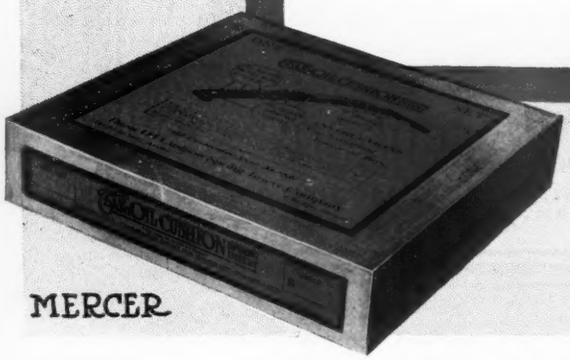
Full instructions for installation are enclosed in each box so that your local garageman or repairman can easily equip your car's springs with the Insert. Or, if you do your own work around your car, you can readily install the Insert yourself.

Each box contains sufficient Insert to equip all four springs. Price list for all makes of cars sent on request. IN ORDERING DIRECT, SPECIFY CAR'S MAKE, MODEL AND YEAR.

"Oil Cushionize Your Springs!"

Dann Oil Cushion

2252 Indiana Ave.,



MERCER

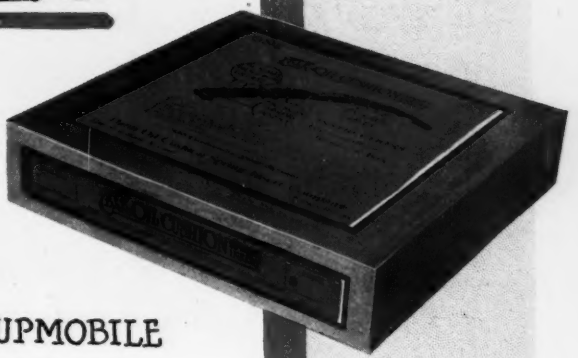
STUDEBAKER

CHALMERS

COLE

READY PACKED MAKE CAR

Motorists who are putting up with squeaky, dry and rusty springs will be interested in our handsomely illustrated booklet, "Why Cars Wear Out." It is free for the asking. Simply send us your name and address on the back of a post card.



The DANN OIL CUSHION SPRING INSERT

HUPMOBILE

"The Insert of 10,000 Oil Pockets"

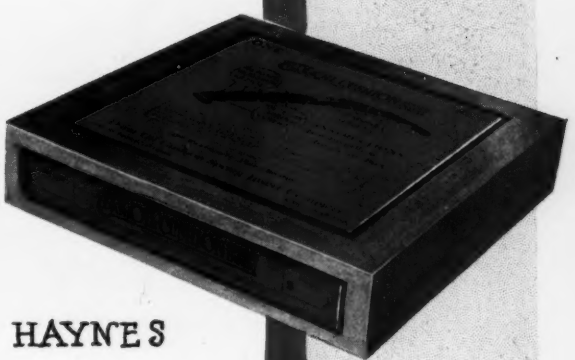
DANN Insert is a thin, perforated strip of specially prepared metal designed to be inserted from tip to tip between spring leaves.

X-Ray view of spring equipped with Dann Insert

The perforations in the Insert are packed with a heavy lubricant. DANN Insert RETAINS lubricant between spring leaves INDEFINITELY. Springs equipped with DANN Insert can't dry, squeak or rust. They rarely break. Write for free sample of Insert.

Dealers Wanted Everywhere

FORD MOTORISTS! The Schaefer Sales Corporation, 1501 Arcadia Building, Detroit, Mich., is prepared to supply the trade and Ford owners with the Dann Ford Insert—cut to proper lengths, neatly packed in a box, and ready for immediate installation between the spring leaves of any Ford car. Complete instructions accompany each order, making it an easy matter for you or your garageman to "Oil Cushionize" your Ford springs with the utmost despatch.



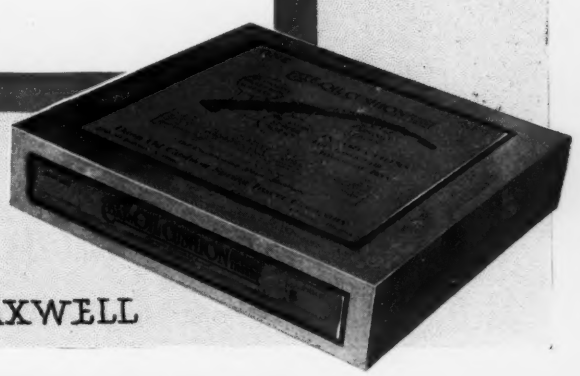
HAYNES

Put Dann Insert on Your Old Car--Demand It on Your New Car

Spring Insert Co.

Chicago, Illinois

LOZIER



MAXWELL

PREMIER

A NEW SERIES—6-49

1915

AND A NEW PRICE

$2385

F. O. B. Indianapolis

A New Standard of High-Grade Automobile Value

The 1915 6-49 has a UNIT POWER PLANT; THREE-POINT SUSPENSION, ELECTRIC LIGHTS and STARTER, LEFT SIDE DRIVE, ONE MAN TOP, STREAMLINE BODY, and the power to provide the snap, getaway and energy demanded by discriminating automobilists

Our best sales argument is to suggest that you compare it, part for part, with any car offered the public at a higher price today—then ride in it and experience the smoothness, ease of riding, comfort, power, and speed if you want it.

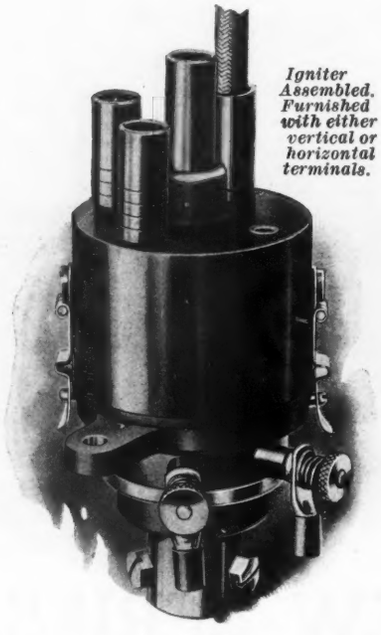
George Weidely never built a better car

PREMIER MOTOR CAR CO., Indianapolis

CONNECTICUT AUT

The hottest spark is necessary at the lowest speeds in order to give efficiency and flexibility to a motor. Especially is this true for starting —by hand or by power.

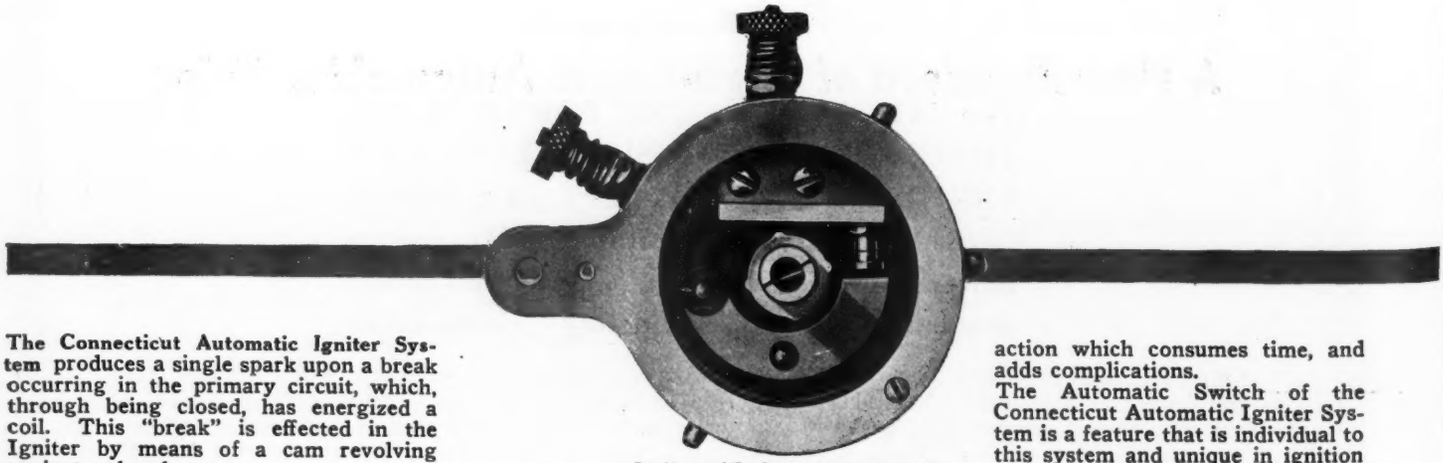
THE first and greatest advantage of Connecticut Automatic Ignition lies in the way it measures up to the requirements of automobile driving. It produces its hottest spark at slow engine speeds—for starting and for slow going—the time when carburetion is poorer and a hot spark is most necessary. This is one of its greatest advantages over the magneto, which, at low speeds, delivers its weakest spark.



Igniter Assembled. Furnished with either vertical or horizontal terminals.

No less important than securing an intense spark for starting and for slow speeds is the way Connecticut Automatic Ignition maintains its spark at all speeds at a relatively greater intensity than the magneto is capable of at best.

Inasmuch as the Igniter is designed to draw its current from a storage battery charged by a dynamo —not to operate on dry cells except in case of emergency—its primary circuit remains closed, except as it is broken by the revolving cam of the interrupter. This method allows for a definite period of time for saturating the primary coil. All high tension ignition is based



Igniter with dust cover removed showing interrupter and cam.

The Connecticut Automatic Igniter System produces a single spark upon a break occurring in the primary circuit, which, through being closed, has energized a coil. This "break" is effected in the Igniter by means of a cam revolving against a breaker arm.

The Igniter is mounted on a vertical shaft running at half engine speed irrespective of the number of cylinders.

The Interrupter Arm is provided with a single insulating roller bearing against the cam, and so is unaffected by centrifugal force. Further, the break in the primary is accomplished directly, not through any relay, trigger, spring or cam action which consumes time, and adds complications.

The Automatic Switch of the Connecticut Automatic Igniter System is a feature that is individual to this system and unique in ignition apparatus. Its function is to kick-off the switch should the primary circuit be closed an unwarranted length of time, as in the case of a car being left with the switch on and the engine stopped.

OMATIC IGNITION

Carburetion is uniformly poorer, and the combustion of the mixture slower when starting and at slow speeds. The hotter spark an ignition system produces under these conditions, the more practical it becomes.

upon a break in the primary circuit. A break from maximum saturation to zero induces the strongest secondary or high tension current possible, consequently, the most intense spark.

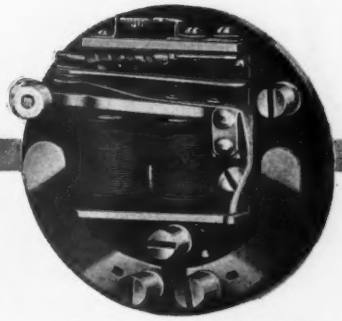
Combined Coil and Switch, cover removed showing terminal connections. Spark Gap is visible with cover in place.

There are two prime factors which dominate all others in accomplishing efficient ignition—the production of a spark of maximum intensity — and the production of such a spark synchronously. These factors or elements are so closely related—so dependent one upon the other that any qualification of one seriously disturbs motor efficiency.

Synchronism, or the invariable recurrence of a spark at the same point in the piston's travel with a certain spark adjustment is to be the subject of our next advertisement. Synchronism is absolute with Connecticut Automatic Ignition.

After all, flame propagation, with a spark delivered synchronously, is dependent on the quality of the spark.

CONNECTICUT TELEPHONE AND ELECTRIC CO.
MERIDEN CONN.



Interior View of Automatic Switch.

Another purpose is to protect the ignition wiring should a disarrangement occur in the lighting or starting circuit and an excessive and destructive amount of current introduced into the ignition circuit. This automatic "Kick-off" is accomplished thermostatically and is a mechanism that has been employed successfully for many years in Connecticut Telephone Switches. It is fully and completely protected by patents covering automobile uses. Unlike the ordinary overload electrical cutout, which operates instantaneously, this device is so arranged that it will not kick off until the circuit has been closed for a short period of time, which allows sufficient opportunity for cranking after the switch button has been pressed. The releasing vibrator is no more complicated than an ordinary electric bell and will operate without any attention whatever. When the extreme simplicity and effectiveness of this switch is understood, it will be realized what a marked advance in ignition has been made possible by its advent.

WIRE WIN

THOMAS

DURAY

Duplicating their performance of last year, wire wheels again won the 500-mile classic at Indianapolis. The first four cars to cross the tape were wire wheel equipped. Eight of the ten winning cars rode to victory on wire wheels.

Thomas, driving a wire wheel equipped Delage, annexed first place, broke the record for the course, established a new world's record for the distance, broke almost every speedway record from 50 miles up to 500 miles, and won every trophy hung up. Thomas stopped but three times for tire changes—a remarkable evidence of the tire-saving virtues of wire wheels when his terrific rate of speed is considered. This car finished with one of its original tires intact.

Duray, driving a wire wheel equipped Peugeot, took second place. He stopped but twice for tire changes.

Guyot, driving a wire wheel equipped Delage, took third place. He stopped but **once** during the 500-mile grind for tire changes, finishing with two of his original tires intact.

Goux, driving a wire wheel equipped Peugeot, took fourth money. Goux last year won the race on wire wheels.

The fact that 25 of the 30 cars which faced the starter were equipped with wire wheels was complimentary to the judgment of the world's greatest racing drivers.

WHEELS 1-2-3-4

GUYOT

GOUX

These drivers realized that the safety and maximum tire mileage offered by wire wheels would prove to be tremendous factors in the winning of the race. In this connection it is interesting to note that no car equipped with wire wheels was put out of the race because of wheel trouble, whereas a wood wheel equipped car was forced to drop out because its wheels collapsed.

Car manufacturers, dealers and motorists will read a moral in the wire wheel victory at Indianapolis. It is but an indication of the coming standardization of the wire wheel in American automobile construction.

If you are interested in reducing tire expense, in bettering the looks of your car, as well as its easy riding qualities, in increasing its safety—you will be interested in HOUK DETACHABLE WIRE WHEELS.

Progressive manufacturers already offer HOUK DETACHABLE WIRE WHEELS as standard equipment on their cars.

Progressive dealers recommend and show cars equipped with HOUK DETACHABLE WIRE WHEELS.

Progressive motorists seeking safety, quick change convenience, and maximum tire mileage **demand** HOUK DETACHABLE WIRE WHEELS.

WRITE FOR FULL INFORMATION

Manufactured by the
Houk Mfg. Co., for Geo. W. Houk Co.,
1705 Elmwood Ave., Buffalo, N. Y.

BRAENDER TIRES ADD T

Again They Make a Wonderfu Sh

Following the consistent performance at the Indianapolis track last year and at the Vanderbilt Race this year, the remarkable showing of this make of tire is unequaled in the tire history of the world.

Chandler in a Braender Bulldog went 67 laps equipped with Braender tires. Broke connecting rod.

Carlson in Maxwell made best showing of American cars. Equipped with Braender tires.

Rickenbacher in Duesenberg started with other tires but found it necessary to buy Braender tires to finish.

Dawson in Marmon went 44 laps equipped with Braender tires. Met with accident.

Tetzlaff in Maxwell equipped with Braender tires went 37 laps. Caught fire.

Bragg in Mercer went 116 laps with Braender tires. Broke cam shaft gear.

Wilcox in Grey Fox went 65 laps on Braender tires. Broke valve.

Anderson in Stutz went 41 laps with Braender tires. Broke cam shaft.

Cooper in Stutz went 118 laps with Braender tires. Capsized.

Klein in King went 85 laps equipped with Braender tires. Burned bearing.

Mulford in Mercedes went the entire distance equipped with Braender Shoes. He lost 20 minutes on account of broken chain.

These drivers purchased Braender tires for their cars. They were not paid to use them nor were the tires given to them.

REMEMBER BRAENDER TIRE WON FIRST, SECOND, THIRD AND FOURTH IN THIS YEAR'S VANDERBILT RACE.

GOOD TIRE QUALITY WITH US IS NOT AN ACCIDENT. THESE CONTINUOUS VICTORIES ARE PROOF POSITIVE OF THE FACT. EVERY BRAENDER TIRE IS "MADE"—NOT MANUFACTURED. QUANTITY PRODUCTION HAS NEVER BEEN OUR AIM.

Quality? Always

TO THEIR LAURELS

Showing at Indianapolis

Here are a few more of Braender's Remarkable Racing Records

On February 26th Ralph DePalma, participant in scores of hard fought contests, won his second Vanderbilt Cup Race, on the Santa Monica course. His time was 3:51:41. DePalma, with Braender Tires, made the victory at an average speed of 75.6 miles an hour. It is freely admitted by all those who witnessed the contest that DePalma's victory was because of the fact that throughout the entire grind of 294 miles HE WAS NOT REQUIRED TO STOP FOR A CHANGE OF TIRES. This is admittedly the greatest victory on record, and is a wonderful commentary on tire quality. Two days later DePalma in a Braender equipped Mercedes took fourth in the GRAND PRIZE, using the SAME SET OF TIRES with which he won the Vanderbilt race.

Barney Oldfield finished second, with Braender Tires; Carlson finished third and Cooper fourth. Both drove on Braender Tires. This and the following record of past consistent performance, is the best evidence we know of to substantiate the claim that Braender Tires are the best in the world.

At the Indianapolis Speedway, last Decoration Day, Ralph Mulford drove his big Mercedes through the entire 500-mile International Sweepstakes Race on a set of four Braender Tires WITHOUT A SINGLE TIRE CHANGE, making an average speed of 67 miles per hour. Think of the terrific heat, the grinding friction, the smashing strains his tires withstood so successfully.

At Columbus, Ohio, July 4th, Mulford, in a Mason, won the 200-mile race on Braender Tires, WITHOUT A CHANGE. At Elgin, Ill., August 30th, Gil Anderson won the 301-mile Elgin National Trophy Race in a Stutz shod with Braender Tires. Mulford took second place in his Mason, driving the entire race on Braender Tires, WITHOUT A CHANGE. Bergdoll in the Erwin Special and Haupt in a Mason also used Braender Tires, WITHOUT CHANGE. Mulford's tires were the same set he used the day before in the C. A. C. Trophy Race, and drove five races, winning two, at Galveston a few days previous, making a total of 900 miles. The same tires were used in the races at Sioux City, Minneapolis, Milwaukee, Detroit and in the 100-mile race at Cincinnati—ALL WITHOUT A CHANGE.

Braender Tires have established the World's Record for tire endurance and quality. You can buy the same quality tires from any Braender Dealer. They are unquestionably the strongest, most durable and most economical tires in the world. How can you afford to use any other?

BRAENDER RUBBER & TIRE COMPANY

1987 Broadway, New York **Main Office and Factory: Rutherford, N. J.**

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The Alfredal Co.....1467 S. Michigan Ave., Chicago, Ill.	Ketcham & Lawrie.....259 Halsey St., Newark, N. J.
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Keystone Motor Supply Co.....3302 Grant Blvd., Pittsburgh, Pa.	Queens County Tire Repair Co.....Flushing, L. I.
Motor Accessories Co.....6521 Euclid Ave., Cleveland, O.	Browntun Tire Co.....510 E. Genesee St., Syracuse, N. Y.
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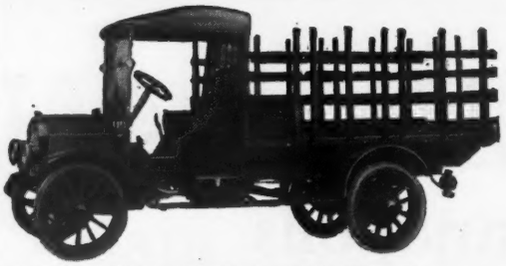
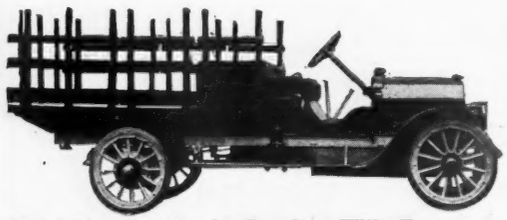
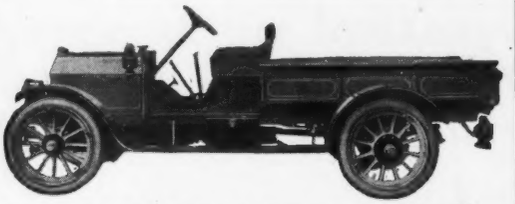
Dayton Tire Co.....589 Boylston St., Boston, Mass.	Stevens Hotel Co.....Lake Placid, N. Y.



Model C, 1½-Ton Truck, Complete With Express or Stake Body, $1,950.



Model B 1-Ton Truck, Complete With Express or Stake Body, $1,500.



Model A-3, 1,500-lb. Truck, Complete with Express or Stake Body, $1,200.

"The MENOMINEE" TRUCKS
FOR ECONOMY

And the Dealers who Handle Them

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You can get full information about MENOMINEE Trucks from any of the above dealers. Or, write us direct for catalog containing detailed descriptions. We can accommodate a few more dealers in all parts of the country. Write for generous agency proposition.

D. F. POYER COMPANY
MENOMINEE, MICHIGAN

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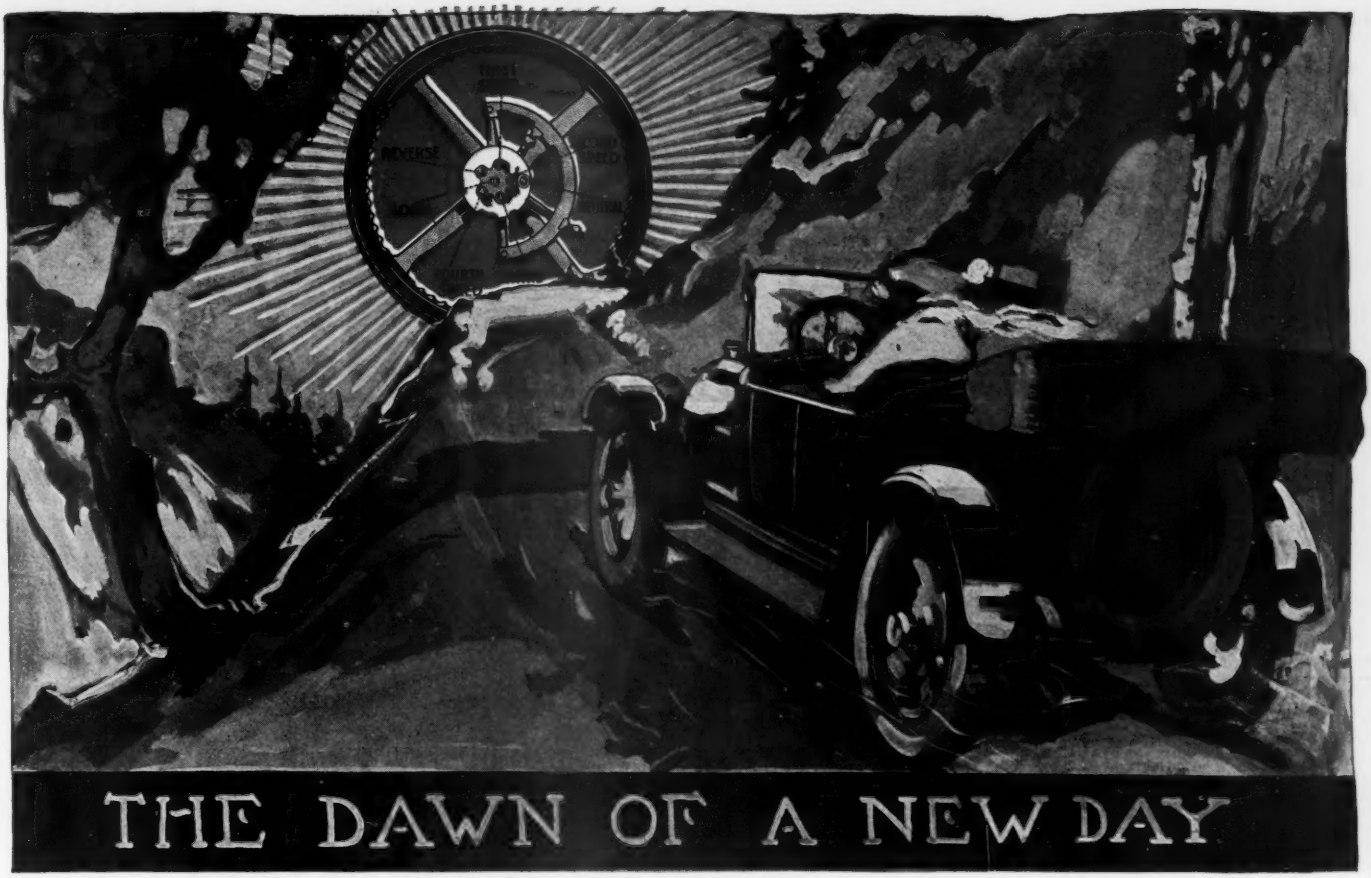


Here is another epoch-making application of an old principle—the use of the push button and electro-magnet to simplify and render safe the control system of the gasoline motor car.

So ***simple*** is this improved method of shifting gears by ***electricity*** that it is a wonder no one has used it before. It places the ***most powerful gasoline car completely under the control*** of even a woman, and makes its operation as ***simple as*** that of a ***kodak*** or the ***ringing*** of a ***door bell.***

The Vulcan Electric Gear Shift ***completes*** the ***electrification*** of the gasoline automobile. The electric starter eliminated the starting crank; the control lever now follows.

The Vulcan Electric Gear Shift will be the ***greatest*** acknowledged ***refinement*** on ***1915 cars.*** A number of manufacturers have already incorporated it into their designs; others are hastening to adapt it to their present models, both here and abroad. ***No single improvement has ever created the wide-spread interest*** that this electric gear shift has. The ***increasing stream of letters*** pouring into our offices attests this fact.

Now is the time to investigate the Vulcan Electric Gear Shift.

Full particulars by addressing

The Vulcan Electric Gear Shift Dept.

The Cutler-Hammer Mfg. Co.

Milwaukee, Wisconsin

Manufacturers of

The VULCAN ELECTRIC Gear Shift

10,000 Miles Guarantee

Brictson Tires are backed by the strongest guarantee ever put behind a pneumatic tire

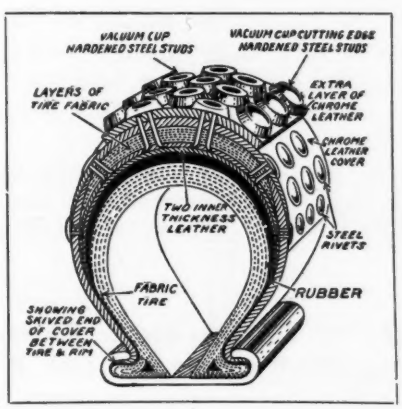
Never before have tire users been offered such assurance of continued service

Brictson Pneumatic Tires give you real Tire Economy

Brictson Pneumatic Tires are sold under a specific 10,000-mile written service guarantee, based on the results of six years' experience. They free you from the dangers of punctures, blow-outs and rim-cuts. Proof against oil, gasoline and ruts. Their wonderful resiliency contributes greatly to your comfort when you ride.

Your Tires Can Readily be Rebuilt the Brictson Way

If the fabric in the tires you are now using is in good condition, we can take them and make them proof against rim-cutting, punctures, blow-outs, side-wall breaks, skidding, ruts and oil. This will give you thousands of miles of added service.



Ten days' free trial offer. Try Brictson Tires at our risk

To remove any possible doubt regarding the merits of Brictson Tires, and to back up our statements fully, we will allow you to use these tires on your car for ten days at our risk. If you do not find them perfectly satisfactory in every way, return them to us at any time within ten days and we will refund the entire purchase price. Send your order today.

For full particulars mail back the coupon.

The Brictson Mfg. Co.

1264 Brictson Bldg.
Brookings, S. Dak.

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Mail Back This Coupon

Brictson Mfg. Co.,
1264 Brictson Bldg., Brookings, S. D.

Please send me full particulars about Brictson Tires, also explain how my own tires can be rebuilt the Brictson Way.

Size of Tires.....

Name .....

Address .....

Dealer's Name .....

VOLTAIRE SAID:—"A Good Disposition Can Laugh at Itself."

If you own a Ford Car you can appreciate the above illustration. If you can appreciate a joke on yourself you can laugh at it.

Don't misunderstand. We have no criticism to offer for the Ford Car, nor apologies. On the contrary, we think it the greatest motor car in the world. That's the reason we set about improving it, the only possible place it could be improved. The Ford is lacking in nothing—power, low up-keep, and everything demanded of a motor car except one requisite—that is a starter. Here the BOSTON STARTER has "come across" with the soundest and most reliable mechanical requirement.

THE BOSTON STARTER is as efficient as the best electric starter. It can be installed by the average mechanic in a few hours, starts the motor every time, outlives the car and is more easily operated than the crank. THE BOSTON STARTER is the one best starter for Ford cars. It sells complete ready to install at $25 (F.O.B. Boston). If your dealer doesn't have it, write us direct.

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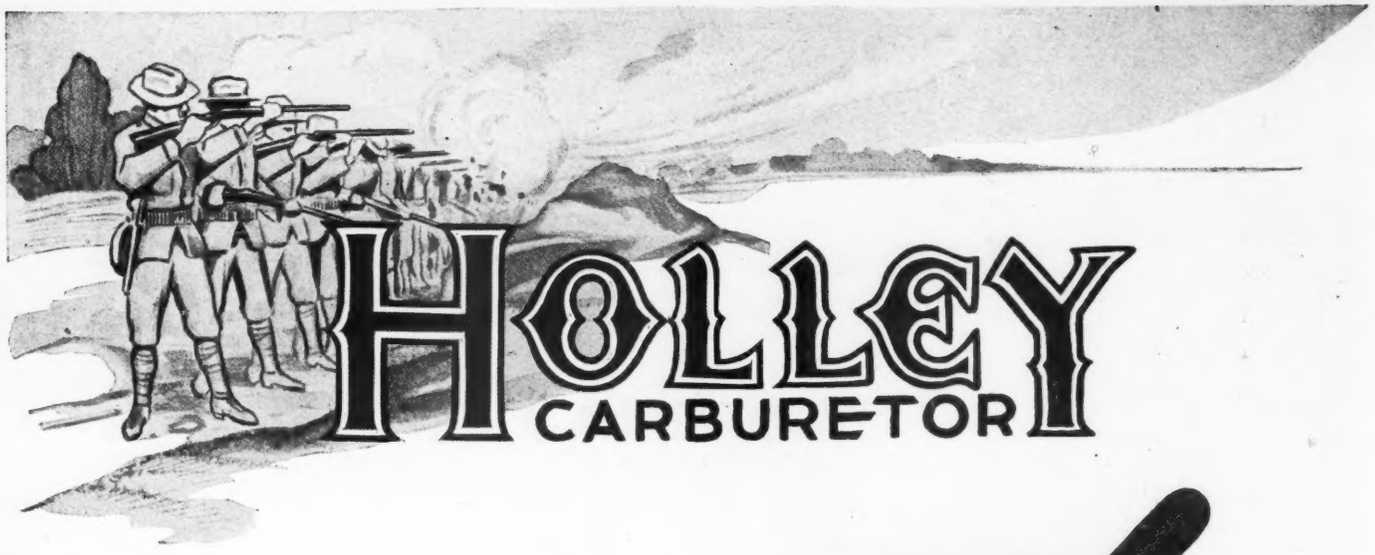


GUN makers have found springs most unreliable.

They have not been able to perfect a spring that is not affected by heat or cold.

They say that it is not unusual for the main spring of the gun to snap into pieces, even when the gun is not in use.

Springs become weak and treacherous.

According to the Encyclopedia Britannica, some military rifles have been absolute failures because of the unreliable features of their springs.

Springs are used in gun locks because nothing better has been found to take their place.

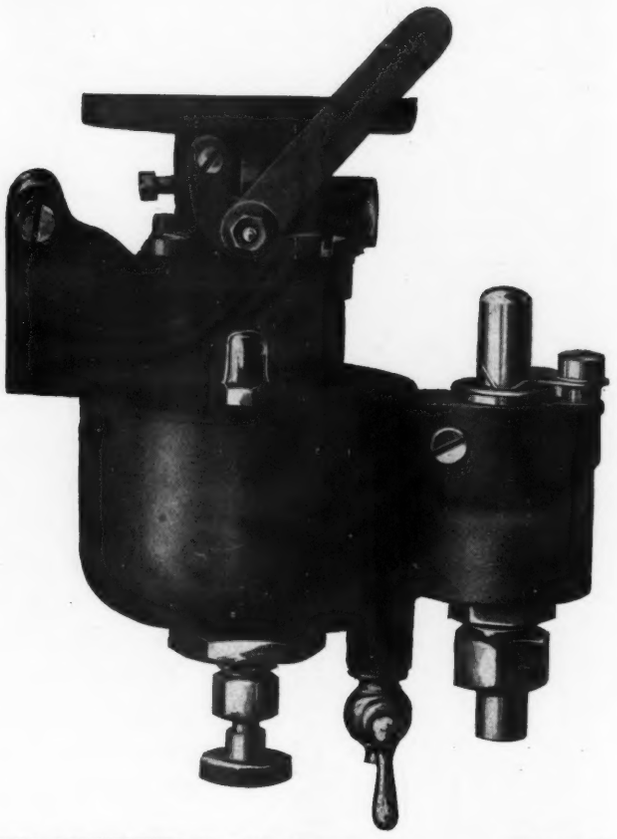
Springs have been used in carburetors for the same reason until recently.

The new self-adjusting Holley has no springs. It depends entirely upon natural forces of gravity and air pressure for its operation—hence, it is accurate and reliable.

225,000 now in use.

One on your car will pay for itself in 5,000 miles of driving.

See our nearest dealer or write direct to



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Holley Carburetors are carried in stock at the following addresses: CHAS. E. MILLER, Home Office: 97-103 Reade St., and 121 Chambers St., New York.

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New York City.....2782 Broadway, between 107th and 108th Sts.
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Hartford, Conn.....274 Trumbull St.
Atlanta, Ga.....66 Edgewood Ave.
Brooklyn, N. Y.....1421 Bedford Ave.
Buffalo, N. Y.....824 Main St.
Albany, N. Y.....135 Central Ave.
Boston, Mass.....202-204 Columbus Ave.
Detroit, Mich.....227-229 Jefferson Ave.
Cleveland, O.....1829 Euclid Ave.
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Holley Brothers Company

Detroit **Michigan**

When Writing to Advertisers, Please Mention Motor Age.

Note how many Cars have No-Rim-Cut Tires with This Matchless All-Weather Tread

Goodyear Prices

What They Buy

At Goodyear prices, this is what you get today in an automobile tire:

The tire which—starting from a tiny factor—won against some scores of rivals the topmost place in Tiredom.

The tire of which more than three million have been put to the test of use. And which this year—after those millions of mileage comparisons—has jumped 55 per cent in sales over last year.

The tire which scores of experts—working in laboratories—have spent years and years in perfecting. They have built thousands of tires in thousands of ways to learn how to better this one. In these ways they have spent $100,000 yearly to attain the farthest limit in low cost per mile. And all their achievements are embodied today in this Goodyear No-Rim-Cut tire.

You get the tires which once cost users one-fifth more than other standard tires. They retain the same costly features. And today—as then—No-Rim-Cut tires are the only tires which have them.

Four Exclusive Features

Our No-Rim-Cut feature is found in these tires alone. That completely stopped rim-cutting, the major cause of tire ruin. And it brought you this saving in a feasible, faultless way.

Our "On-Air" cure is employed in no other tire. It adds $1,500 per day to our tire cost. But it saves our users the countless blow-outs due to wrinkled fabric. We final-cure on air-filled tubes, under actual road conditions.

Our rubber rivets are created in these tires only. Hundreds are formed, during vulcanization, to combat loose treads. Thus we lessen this danger by 60 per cent.

All-Weather treads are exclusive to Goodyears. These are double-thick, tough anti-skids. They are flat so they run like a plain tread, yet they grasp wet roads with deep, sharp, resistless grips.

Note again those four exclusive features. Mark that they cover the four greatest tire troubles. Together they have made No-Rim-Cut tires the most popular tires in the world. They've saved motorists millions of dollars. And no other tire, whatever its price, offers you one of them—or anything that fairly compares with them. **You get them all in No-Rim-Cut tires, and you get them at Goodyear prices.**

Higher Prices

Are They Just?

Now comes a condition where 16 makes are being sold above these Goodyear prices.

Some are nearly one-half higher. Numerous makers charge for three tires as much as four Goodyears cost. Tires which once undersold No-Rim-Cuts now cost you $4 to $15 more than these per tire.

It has come about in this way:

In the past few years No-Rim-Cut prices have been cut in two. Last year alone these prices dropped 28 per cent.

Other makers shared our lower cost for rubber. But we made other savings. We built new factories, modernly equipped. We invented and built money-saving machines. We employed efficiency experts.

Our output doubled over and over, until it lately exceeded 10,000 motor tires in a day. Our overhead cost dropped 30 per cent—labor cost 25 per cent. All because of this matchless output.

Profit Down to 6½ Per Cent

With multiplied output came the need for less profit. Last year we brought the average down to 6½ per cent.

The result of all is this year's Goodyear prices. They have come down so fast and far of late that others have ceased to follow. And the paramount question in Tiredom today is this question of extra price.

The self-evident truth is this:

You get in Goodyears the utmost in a tire. Their place and prestige prove that. Their amazing sales, after years of comparison, show what men have proved about them.

You get in Goodyears four great features which no other maker offers. Each adds to our cost but reduces your upkeep. And no extra price can buy one of them.

As for "quality" in a tire—that can mean only minimum cost per mile. And all our tests show that we have that. Any item of "quality" which means higher cost per mile is something no user wants.

It is folly to add to your tire cost. Get Goodyear tires at Goodyear prices. Almost any dealer will supply them.

GOODYEAR
AKRON, OHIO
No-Rim-Cut Tires
With All-Weather Treads or Smooth

THE GOODYEAR TIRE & RUBBER COMPANY, AKRON, OHIO

Toronto, Canada **London, England** **Mexico City, Mexico**

Dealers Everywhere **Branches and Agencies in 103 Principal Cities** **Write Us on Anything You Want in Rubber**

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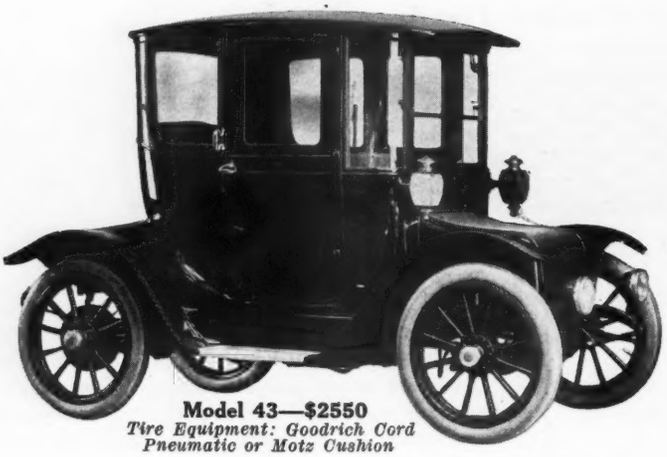


Model 43—$2550
Tire Equipment: Goodrich Cord Pneumatic or Motz Cushion

THE Detroit ELECTRIC
SOCIETY'S TOWN CAR

PRICES

With Bevel Gear Axle

4-passenger Brougham
Rear seat drive.....$2550
5-passenger Brougham
Front seat drive..... 2800

With Worm Gear Axle

Gentleman's Roadster.....$2500
4-passenger Brougham
Rear seat drive..... 2850
5-passenger Brougham
Detroit Duplex Drive..... 3000

How Quality is *Manufactured* Into the Detroit Electric Special —$2550

When you place your order for the Detroit Electric Special, you buy a thoroughly common-sense electric. Its lightness, style, economy, safety at any speed, power, and ability to climb any hill make the Detroit Electric Special the most sensible and practical electric ever built.

Quality in the Detroit Electric Special is due largely to the fact that it is a **manufactured** car, produced in our own shops instead of being put together from miscellaneous parts purchased in the open market.

We build our own motors, bodies, batteries, controllers, rear axles,—we make our own special tools and jigs—to insure absolute accuracy; and we do all this in the greatest—the most completely equipped—electric car factory in the world.

For the small manufacturer such a policy would be extravagant if not impossible. But this policy is economical and logical with the manufacturer of the Detroit Electric, for Detroit Electric cars lead all others in volume of sales. In fact, every third electric built and sold today is a Detroit Electric.

Thus, we can afford not only to create more real in-built quality in our cars than any other electric possesses, but our large output also makes it possible to sell the Detroit Electric Special at from $300 to $500 less than is asked for other electric cars.

Catalog and information about the Detroit Electric opportunity to dealers on request.

Anderson Electric Car Company, Detroit, Michigan

Builders of the Detroit Electric
World's Largest Manufacturers of Electric Pleasure Vehicles

Firestone Rims are used by more car manufacturers than those using all other rims combined. More Jobbers and Dealers carry Firestones than all others combined.

Firestone

QUICK DETACHABLE DEMOUNTABLE RIMS

FIRESTONE Rims lead in the motoring world because they answer all rim problems of Efficiency, Safety, Convenience, Simplicity and Tire Protection.

Easiest to operate. Just loosen six nuts. Continuous wedge ring falls out—rim slips right off. Thirty degree angled sides of wedge ring prevent sticking. No pliers needed.

Nothing to rust or wear out or get out of order. It always "works."

Standardized Felloe Band. Six types fit same felloe band with same demountable features.

Continuous wedge ring support does away with local wedges. Insures safe, even riding.

Endless chain of Firestone Stations—Dealers, Branches, Agencies everywhere—supply the best rim service anywhere possible.

Write for Rim Catalog.

Firestone Tire & Rubber Co.

"America's Largest Exclusive Tire and Rim Makers"

Akron, Ohio—All Large Cities

Pneumatic Tires, Truck Tires, Pleasure Electric Tires, Carriage Tires, Cycle Tires, Fire Apparatus Tires, Rims, Tire Accessories, etc.

Partial List of Car Manufacturers Using Firestone Rim Equipment

Abbott	Havers	Marmon	Peerless	Stafford
Case	Haynes	McFarlan	Peugeot	Stearns
Chandler	Hudson	Meteor	Pope	Stewart
Chevrolet	Imperial	Mitchell	Premier	Touraine
Cole	Jackson	Moline	Pullman	Velie
Crawford	Kline	National	Simplex	White
Crescent	Lexington	Norwalk	Singer	Winton
Croxton	Locomobile	Packard	Speedwell	Zimmerman
Davis	Marion	Pathfinder		

HIGH and LOW TENSION MAGNETOS

TRADE K-W MARK

MASTER VIBRATORS ROAD SMOOTHERS AUTO LOCKS

Right in Your Neighborhood

TRADE K-W MARK

You will find a Ford Car Equipped with a

Master Vibrator

Ask the owner what it is doing for him every day

$16 with K-W Autolock Switch

You will find him enthusiastic about his K-W. He can tell you better than we of the economy, reliability and efficiency of the K-W Master Vibrator.

The K-W Master Vibrator contains a large, powerful condenser—proper capacity—and exceptionally large, solid platinum iridium contact points. A combination that insures a hot spark.

Over 90,000 Master Vibrator users have learned the value of this hot spark.

The K-W Master Vibrator gives:

Perfect Ignition—More Power—One adjustment instead of four—A hotter spark—Easier Starting —A smoother running engine—Less carbon deposits—Less gasoline used—Cleaner spark plug —No worry.

Don't Use Imitation Springs and Contact Points

K-W Master Vibrator owners are warned against the use of imitation springs and contact points on their Master Vibrators, as these positively will not work. For your protection all K-W points are put up in sealed envelopes, sealed with a label bearing our registered trade mark. Look for this K-W seal and the K-W Trade Mark that is stamped on the top of the "T" shaped bridge.

When replacing contacts use complete new springs. Do not solder new contacts to old springs, as solder destroys the contact and the spring itself will become bent and the cushion effect destroyed. The contact points on K-W Master Vibrators are large and are made of genuine platinum iridium, a material that costs three times as much as pure gold. Make sure you get the genuine with the K-W trade mark. Price $3 per pair.

In buying your Master Vibrator be sure you get a K-W. Look for the K-W trade mark and the serial guarantee number. They protect you against imitations. If your dealer can't supply you we will send one direct, postpaid, on receipt of price.

Write for "That satisfied feeling Folder."

$15 with Regular Kick Switch

HEADLIGHTING OUTFITS

TRADE K-W MARK

THE K-W IGNITION Co.

2835 CHESTER AVE CLEVELAND, OHIO, U.S.A.

SPARK COILS SPARK PLUGS

Mr. Dealer—
Consider These Points—

This is the largest and most complete motor accessory house in the world. Our facilities are unsurpassed. We give YOU service as YOU would have it. Serving over 6,000 dealers—in all parts of the country—from the Atlantic to the Pacific—from the Hudson Bay to the Caribbean Sea—each of whom is a satisfied customer in every respect—is ample proof of our square, upright and conscientious treatment of our trade.

The extensive line of automobile accessories sold under the brand of "GIBSON QUALITY" is the best that can be obtained in any market. Each item in our complete stock is backed unconditionally by the "GIBSON QUALITY GUARANTEE"—satisfaction or no sale. Hence it pays the dealer to stock them.

We have searched the markets of the world for the best obtainable, and have placed nothing in our stock but that which we KNOW to be absolutely dependable, reliable, and of proven value.

Mail orders constitute a large percentage of our business. Because of the great reduction recently in express and parcel post rates, we can offer YOU the many advantages of "GIBSON QUALITY SERVICE," regardless of your location.

Remember—we serve only the legitimate automobile dealer.

Write today for our complete 1914 accessory catalogue!

Gibson Automobile Company

242 Automobile Row
Indianapolis

ACME TORSION SPRINGS

FOR ALL CARS

FOR ALL CARS

GUARANTEED TO MAKE YOUR FORD

The Easiest-Riding Car in the World

Could we make a stronger guarantee? And notice it is not a mere claim—it is a positive guarantee.

WHY? Because ACME TORSION SPRINGS are based on SCIENTIFIC PRINCIPLES, properly applied. ACME TORSION SPRINGS, the only *practical* device on the market that can act FREE with, and CONTINUOUSLY in CONJUNCTION with the LEAF SPRINGS, any way they are called upon to work, and adjust themselves MECHANICALLY to all conditions.

We Challenge Contradiction of Our Claims. Get an **Expert's** opinion.

Equip your car with ACME TORSION SPRINGS.

Insurance for life of occupants, car and easy riding. Don't be fooled by "shock absorbers." What you want is **more** spring capacity under proper Automatic Control. Acme Torsion Springs add at least 18 feet to the total leaf spring area, every inch adding greater resiliency **automatically controlled.**

Acme Torsion Springs stop **vibration**, prevent **spring crystallization and breakage**, minimize tire and **engine** trouble, and improve the riding qualities of any car at least 100%. They cost less than half the price of shock absorbers, and are worth several times as much. **Eliminate Vibration and you eliminate trouble.** We have convinced thousands, let us convince you.

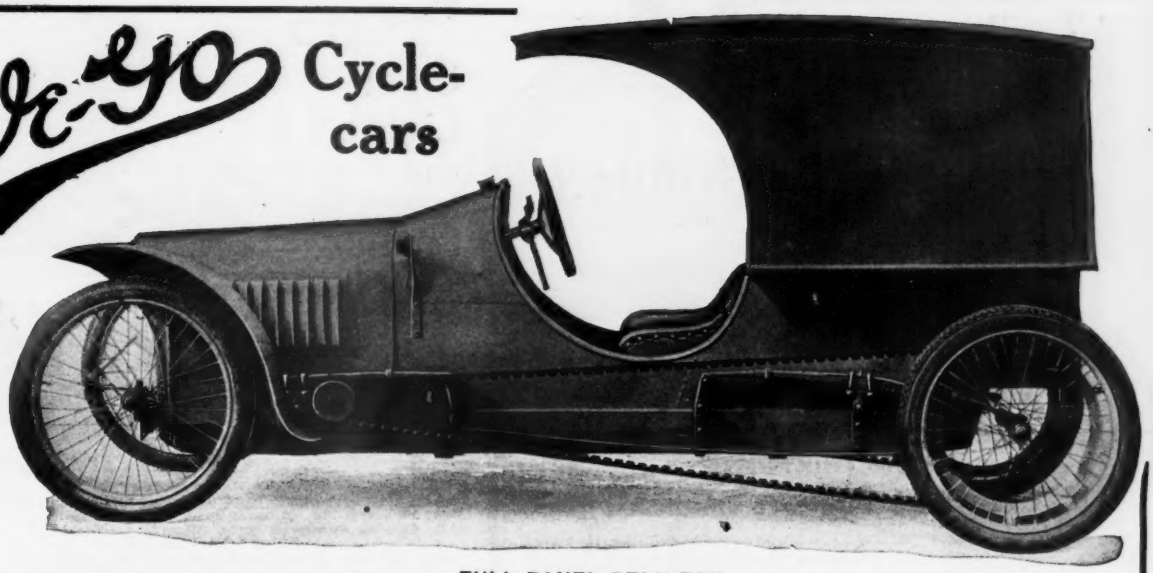
N. B.—Acme Torsion Spring Equipment is fully Guaranteed against Defects and Breakage for the life of the car. Write today for information.

ACME TORSION SPRING CO., 994 Boylston St., BOSTON, MASS.

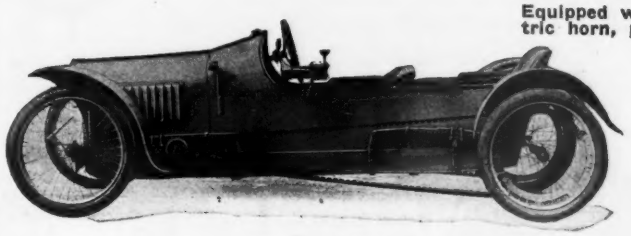
WARNING!
Acme Torsion Springs are covered by U. S. letters of patent, and we have the sole and exclusive right to manufacture, use and sell the same. Take warning that our interests will be protected.

O-We-Go Cycle-cars

WE ARE NOW READY TO MAKE IMMEDIATE DELIVERIES



FULL PANEL DELIVERY.
Equipped with electric lights, glass windshield, electric horn, pump, set of tools and repair kit..$405.00



MODEL A.
Two passenger roadster, equipped with electric lights, glass windshield, electric horn, pump, set of tools and repair outfit $385.00
Top, side curtains and Top cover, extra.....$20.00

There are wonderful opportunities in the business of selling Cyclecars—opportunities such as the automobile has never offered, especially for the man with a limited amount of money to invest. We want dealers in every city, town and village where merchants deliver goods or where there are people who wish to ride.

Write us for our selling plan and tell us how much territory you want and we will show you how to make money.

OWEGO CAR COMPANY, Dept. C

OWEGO, TIOGA COUNTY, N. Y.

They Pay for Themselves in the Fuel they Save

STA-TITE
Perfect Compression
Piston Rings

PATENTED

Old style leaky piston rings can waste as much fuel as a leaky gas tank. Leaky piston rings cause a motor to lose compression—that means short mileage, short power, and *big gas bills.*

STA-TITE Piston Rings *can't* leak. They won't sap the strength of your motor or "kite" your fuel bills. STA-TITE Rings make every drop of gasoline you pour into your fuel tank register "horsepower" at the drive-shaft, and "big mileage" on the speedometer. Have a set installed this spring when you overhaul.

STA-TITE Rings are made in three pieces. All joints automatically seal when the ring is placed on the piston. Adapted to autos, motor boats, etc. Made of special processed gray iron. Can be attached to any piston. Money refunded if not satisfied.

LIBERAL TERMS TO SUPPLY HOUSES AND REPAIR SHOPS

WRITE FOR LITERATURE.

STA-TITE PACKING RING COMPANY

3043 Olive Street **St. Louis, Mo.**

"Hook On This Autowline I'll Pull You Out"

BASLINE AUTOWLINE is the motorist's sure reliance in getting out of road difficulties. A car in a ditch, or a "dead" engine at the foot of a hill, doesn't trouble this little, pliant, 25-foot puller!

Basline Autowline

"The Little Steel Rope With The Big Pull"

has the flexibility, toughness and staying qualities of the world's most famous steel wire rope—"YELLOW STRAND POWERSTEEL." It will take a 4000-lb. car up a 20% rise without a quiver. It's always ready to take a tow or give one. Neat, compact, easy to carry and easy to use—motorists are finding Basline Autowline the one accessory they can't afford to forget. Sold by all dealers everywhere. East of the Rocky Mountains, $3.95. Ask about it today.

FREE An illustrated circular giving all needful Autowline information

Broderick & Bascom Rope Co.

813 N. Second St. **St. Louis, Mo.**

New York Office, 76 E. Warren St.

Manufacturers of famous Yellow Strand Powersteel Wire Rope that helped build the new Municipal Building, New York.

This Is Just Physical Torture

Just physical torture because the hand pump makes the motorist work with it. A hand pump without two strong arms and a strong back behind it, is nothing but a useless piece of tubing with a piston in it.

The motorist's back and arms are left out when it comes to inflating a tire with a

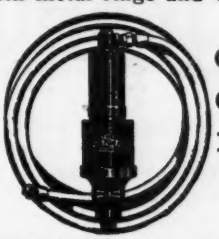
MAYO SPARK PLUG PUMP

The MAYO Pump uses the motor's muscles—permits the motorist to save his. He can take it easy on the running board and watch the motor do the work five times faster than he could with a back-breaking hand pump.

Some motorists still consider a hand pump an economy because of its low initial cost. Apply on the cost of a MAYO what you would ordinarily pay for a good hand pump. Use the MAYO, and it will make up the difference in cost many times over in the physical discomfort it saves you.

The MAYO Pump can be instantly substituted for any spark plug. Pumps pure, cool air only. Built like a motor with metal rings and will last as long.

Lowest Priced Full Grown Power Pump Obtainable



Complete with Gauge, 12-foot Hose and All Connections

PRICE, $10.00

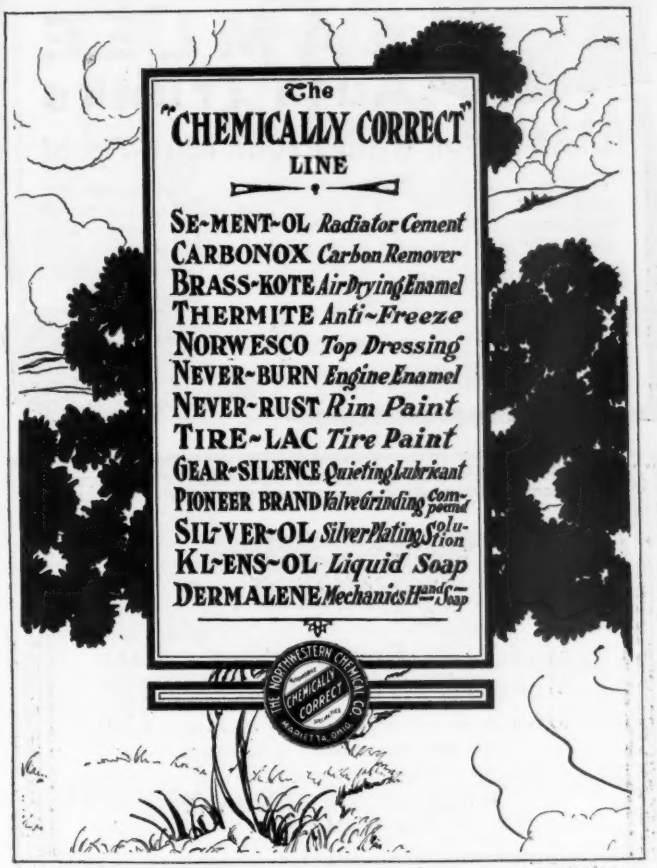
Mayo Quick Detachable Spark Plug, $1.50 Extra

Try a Mayo Pump Free on Your Car for 30 Days

MAYO MFG. CO.

55 E. 18th St. **Chicago, Ill.**

This Is Just Perfect Comfort



NO MAN IS RICH ENOUGH

to afford a cheap Plug in his motor. A poor spark requires a richer mixture and more gasoline. Cheap Plugs, with their cracking Porcelains or oil-soaked mica, lose half the current.

MILLIONS ARE SPENT TO ADVERTISE PLUGS

The millions of delighted users of the HERZ PLUG are our advertisement

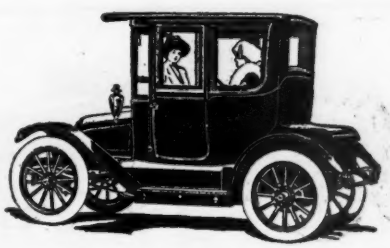
Buy HERZ PLUGS

They will prove the best investment of your life, one that will bear rich interest in

Smaller Gasoline Bills

ASK YOUR DEALER

HERZ & CO., 245 W. 55th Street (Just off Broadway.) New York



Buffalo Electrics

"The car you always admire"

SERVING a distinct need, Buffalo Electrics stand alone as the town car. Their claim to the place they occupy is based upon exclusive features—three point motor suspension—direct drive—noiseless running and the wonderfully simple foot control.

That's only a few points. Our catalogue explains others. Send us your name—today.

Special inducements in localities where we are not represented.

BUFFALO ELECTRIC VEHICLE COMPANY
Successors to Babcock Electric Carriage Co.
1219 Main Street **Buffalo, N. Y.**

20 Days' Trial on Your Motor

A Remarkable Device!

The McCormick Power Plug

(Replaces the Spark Plug)

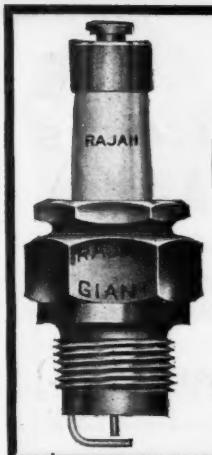
Transforms the ordinary energy from battery or magneto into a flood of high frequency sparks. By instantaneous and complete combustion it maintains full power strokes in the engine. Solid surface electrodes do away with burning, displacement or adjustment of wire points. **Thousands of enthusiastic users.**

A trial will convince you. If you will fill out the form below we will send you a set by insured parcels post for 20 days' trial on your machine. As a bookkeeping facility you can send us check or Money Order at $2.00 for each Power Plug and **we will send it back if you are not in every way satisfied.**

McCORMICK MFG. CO.
204 McCormick Building **Dayton, Ohio**

Make and model.....thread.....
Name .....
City .....
Check enclosed.....State.....

When Writing to Advertisers, Please Mention Motor Age.



RAJAH GIANT PLUG

For pleasure car, motor boat or truck.

Porcelain and metal parts large and strong.

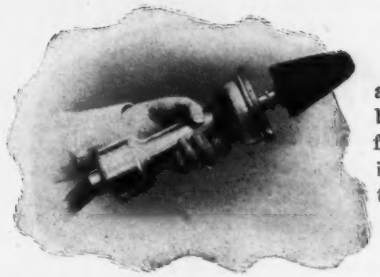
Extremely simple construction for cleaning — only four parts — shell, porcelain, bushing and gasket.

With proper care GIANT Plugs can be used for years.

Rajah Auto Supply Co., Bloomfield, N. J.

John Millen & Son, Limited—Montreal, Toronto, Vancouver, Winnipeg

Car *Cleaned* in 15 min!



a marvel time-and-labor saver; four times faster than hand washing yet harmless to the finest finishes.

The WIZARD WASHER

Saves 75% of the time, labor, muss and fuss of washing autos, carriages, trucks, etc.—*powerful* enough to remove the driest mud, yet *gentle* enough not to scratch the finest mirror finish. A compact, light, simple device—a unique patented nozzle throwing a continuous film of water *around* a rapidly rotating brush.

GARAGES

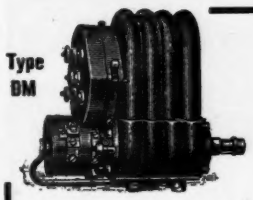
Saves extra help—one man does more satisfactory work than two or three men before. Makes you more profit or cuts your charges.

OWNERS

No need for rubber apron and old clothes; saves backache and temper—four-fifths of your time.

10 Days' Approval Send for descriptive folder or send $15.00, upon receipt of which, Wizard will be sent you subject to approval upon delivery. If not as represented, return at once and money will be refunded. Guaranteed against all mechanical imperfections.

THE CENTURY FOUNDRY CO., Inc.
1622 N. Salina St. Syracuse, N. Y.



HEINZE

HECO

The performance of **HEINZE IGNITION APPARATUS** for the past ten years justifies our claim that our product is superior in both points of construction and efficiency.

HEINZE ELECTRIC COMPANY

SALES OFFICES—DETROIT, MICHIGAN.
FACTORY—LOWELL, MASS.

Service Stations—New York, Detroit, Chicago, Kansas City.

Cool, Delicious Luncheons

—kept fresh in this refrigerator basket—can be packed, carried any distance and enjoyed with a relish. The nickel-plated, tin-lined ice compartment in a

Hawkeye

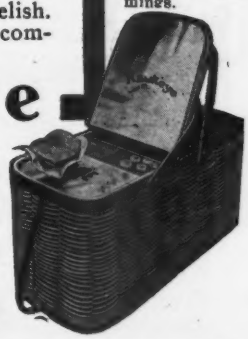
Refrigerator Basket

insures the hungry motorist, sailor or fisherman a temptingly cool, fresh lunch. Keeps both cold and clean. Protected from dust, germs and insects. Does not drip.

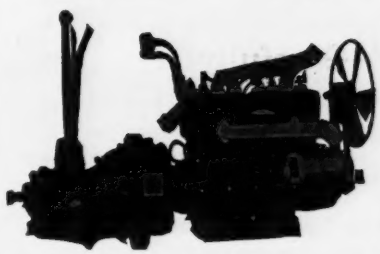
Write for Booklet illustrating basket in detail. Dealers write for special proposition.

Burlington Basket Works
South Burlington, Iowa

Tonneau Basket Rattan, finished deep forest green; lined with non-rustable nickel-plate. Brass or nickel trimmings.



Motors G-B& S Motors



We beg to announce our latest four cylinder Unit Power Plant.

This Motor includes the recognized engineering practice, *here and abroad.*

"Craftsmanship of long experience is the result of this distinctive Power Plant."

Detailed information on request, and we are in a position to make prompt deliveries according to contract.

GOLDEN, BELKNAP & SWARTZ CO.
DETROIT, MICH.

EISEMANN

The performance of Eisemann Ignition Systems during the Indiana-Pacific Tour justifies every claim we have ever made for Eisemann efficiency and dependability.

The Eisemann Magneto Co.

Sales and General Offices
32-33d St., Brooklyn, N. Y.

New York 23 W. 52nd St. Indianapolis, Ind. 514 N. Capitol Ave. Detroit, Mich. 802 Woodward Ave.

Quality in a Lubricant should be your only consideration

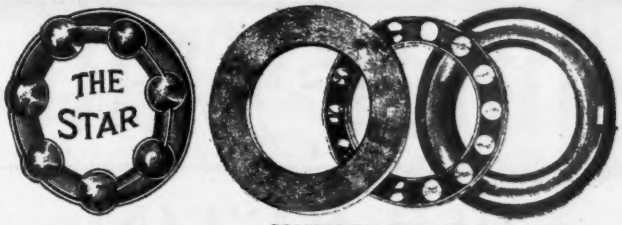
TRADE MARK REGISTERED IN UNITED STATES PATENT OFFICE

NON-FLUID OIL

It has been tested and proved that NON-FLUID OIL will lubricate better, give more power and last longer than any other automobile lubricating agent in the world today. Buy the best for best results.

Insist on the orange-colored can bearing the sprocket-wheel trade-mark.

New York & New Jersey Lubricant Co.
165 Broadway, New York.
1430 Michigan Ave., Chicago.



COMPLETE THRUST BEARING

RADIAL RETAINERS

The Star Ball Retainer Co.
Lancaster, Pa., U. S. A

Manufacturers of Radial Ball Retainers, Thrust Ball Retainers, Complete Thrust Bearings

CRIMO For The Auto

A guaranteed carbon remover; your money back if it fails to satisfy. Every gallon bought is at our risk.

$4.00 a gallon saves many times its cost

It increases your power; decreases your gasoline bill. Application is simplicity itself. Write us for particulars.

Crimo Carbon Cleaning Company
611 Edmond Street, St. Joseph, Missouri

A. Gramm's Trucks

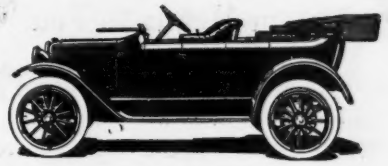
A Size for Every Need 1, 2, 3½ and 5 Tons Capacity

Backed by 14 Years' Successful Motor Truck Building

The Gramm-Bernstein Co., Dept. 9, Lima, Ohio, U. S. A.

The Detroiter — A Complete Line $850 to $1050

Five Passenger Touring Car



32 H. P. Long Stroke Motor

Enclosed Valves, Three Point Suspension, Unit Power Plant, Platform Rear Springs, Full Floating Rear Axle, Left Hand Drive, Center Control, Drop Frame, Large Tires, Complete Ball Bearing Car.

BRIGGS-DETROITER COMPANY, 455 HOLBROOK AVE., DETROIT, MICH.

WRITE FOR SPECIFICATIONS

More 1914 pleasure car and commercial car models are equipped with STROMBERG Carburetors than with any other make of carburetor.

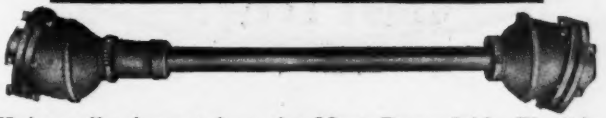
A STROMBERG under the hood is the hall mark of a QUALITY car.

Write for free booklet containing "Reasons Why."

"The Accepted Standard"

Stromberg Motor Devices Company, 54 East 25th St Chicago, Ill.

Spicer Universal Joints



Universally Accepted as the Most Dependable Flexible Connection Known to Motor Car Practice

Oil-Tight — PARTS INTERCHANGEABLE — Dust-Proof

SPICER MANUFACTURING CO., Plainfield, N. J.

Sales Representatives:
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L. D. Bolton, 2215 Dime Savings Bank Bldg., Detroit
Thomas J. Wetzel, 29 W. 42d St., New York
Foreign: Benjamin Whittaker, 21 State Street, New York

The Vulcan 27

"The World's Greatest Light Car"

1914 is to be the year of the Light Car — the low upkeep car — the VULCAN.

Send for catalog and generous dealers' proposition

VULCAN MFG. CO., Painesville, Ohio Lock Box MA477

THE RUTENBER MOTOR

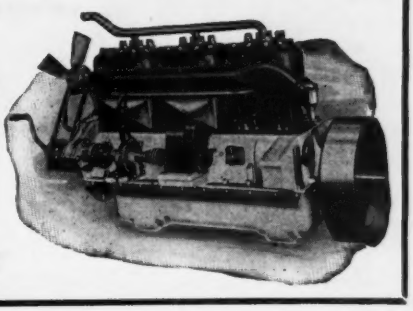
MANUFACTURED SINCE 1901 FOR HIGH GRADE

AUTOMOBILES AND TRUCKS

8¾ x 5¼ four and six cyl.
4¼ x 5¼ four cylinder
Standard or Unit
and
4 x 4 and 4½ x 5½ standard types, all L head, 4 cycle.

Manufacturers are invited to investigate our service and our facilities.

Literature on request.



The Rutenber Motor Company
Marion, Indiana

The Clearing House
of the Motor Car Industry

For Second Hand Cars, Surplus Parts, Accessories, Tires, Machinery & all other Special Announcements of a Similar Character.

CARS FOR SALE

FOR SALE—Special rebuilt Premier six roadster, 75 miles an hour and a bargain at $1,000.

J. F. CHARLEY AUTO CO.,
Evansville, Ind.

FOR SALE—60 H. P. BIG SIX MITCHELL Roadster, 1913 model, completely equipped. Practically new, having been run less than eight hundred miles. Cost $2,500; will sell at once for $1,650. M. E. LeSourd, Bellefontaine, O.

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OF USED CARS

You will surely find one to fit your requirements. You can get from us good, serviceable machines for $400 and up. Let our reputation be your guide.

PACKARD MOTOR CAR COMPANY OF CHICAGO
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Mitchells, Rebuilt, Guaranteed
These cars are fully equipped. Call or write for further particulars.
MITCHELL AUTOMOBILE CO.,
2334-36-38 Michigan Ave., Chicago

MODEL F 7-PASSENGER STODDARD-Dayton. Perfect condition, except tires, $450. A guaranteed bargain. F. E. Alford, Goshen, Ind.

Specially Made for the Indianapolis Track Race Prize Winner
90 miles per hour, special racing machine $3500
70 miles per hour, G. J. G. speedster 1275
G. J. G. MOTOR CAR COMPANY
WHITE PLAINS, N. Y.

STANLEY STEAMER
10 H. P., fully equipped, A1 condition. New boiler. For quick sale, $285.
Address BOX E 123, care Motor Age

STEARNS, 30-60, OVERHAULED and repainted, demountable rims, up-to-date in every respect.
CONDON
2635 Wabash Ave., Chicago

CYCLE CAR ACCESSORIES

CYCLE CAR AND SMALL CAR PARTS
Everything needed at less than cost to manufacture. Frames $4. Front and Rear Axles $40 set. Springs $9 set. Wheels complete with Bearings and hub caps $9 set. These parts are all new and guaranteed. Send for BARGAIN SHEET giving dimensions.
DEQUINDRE AUTO REPAIR CO.
474 Larned St., E., Detroit, Mich.

CYCLE CAR PARTS
Motors, Steering Gears, Transmissions, Frames, Rear Axles.
—Catalogues Free—
PALMER BROS.,
Cos Cob, Connecticut

STEERING KNUCKLES, YOKES, front axles, springs, wheels, gear or friction transmission.
MINNEAPOLIS MOTOR CO., AGENCY
1123 Michigan Ave., Chicago

MAGNETOS

A BIG BARGAIN IN MAGNETOS
Swiss Magneto, $22.50; Simms Magneto, $25.00; Remy Magneto and Coil, $25.00; Splitdorf Magneto and Coil, $30.00; Bosch K-4 dual Magneto and Coil and 4 Magnetic Plugs, $30.00; Bosch K-4 single Magneto and 4 Magnetic Plugs, $25.00. The above magnetos are new or slightly used. Guaranteed to be in perfect condition. We repair all makes of magnetos and coils.

PELLETS MAGNETO EXCHANGE
1606 Michigan Ave. Chicago, Illinois

ALL MAKES OF MAGNETOS AND COILS repaired, bought, sold and exchanged. Service station for Simms, Michigan and National. Mail orders given special attention. Get our prices before going elsewhere. **HECHT MAGNETO EXCHANGE, 228 West 49th Street, New York.**

MAGNETOS
Repaired, remagnetized; prompt service on all makes.
Get our exchange proposition on new K-W for old equipment.
Spark Coil, Storage Battery and Carburetor Repairs.
Northwestern Distributors.
K-W magnetos. Schebler carburetors. Vesta lighting equipments.
Kellogg Self Starter and Tire Inflaters.
REINHARD BROTHERS CO.,
Minneapolis, Minn.

MAGNETOS
We have some wonderful bargains in brand new model "X" Splitdorf magnetos especially reduced from $75 to $25, complete with coil. Also a large number of other magnetos at wrecking prices.
Send for our Price Wrecker, the money saver.
TIMES SQUARE AUTOMOBILE CO.
World's Largest Dealers
S. W. Cor. 56th St. and Broadway, N. Y. City
1210 Michigan Ave., Chicago, Ill.

MAILING LISTS

A COMPLETE LIST OF
Auto Dealers—20,572—$30 or $3 per M by states.
Complete list of Ford Dealers—5,150—price $15 or $4 per M.
Garages—13,515—$25 or $3 per M by states.
Repairs—8,466—$15 or $3 per M by states.
Supplies—6,964—$12 or $3 per M by states.
Auto Mfrs., U. S. and Canada—626—$3.
544 Auto Dealers, second-hand—$4.00.
14,000 Auto Truck Owners—$3.50 per M.
AUTO OWNERS in majority of states is $2 per M, in lots of 1 to 10 M. Larger lots price is interesting.
7,500 auto owners in Canada, $4.00 per M.
FORD OWNERS in most states is $3 per M; some states price is higher.
Can furnish Automobile Dealers any make of car.
WRITE US YOUR NEEDS
All dealers, garages, supplies, manufacturers and repairs are typewritten and show financial rating
TRADE CIRCULAR ADDRESSING CO.,
166 West Adams St.
Phone: Franklin 1183 Chicago, Ill.

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New Pistons, Rings, Pins

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30 x 3½	7.20	34 x 4	9.65
		36 x 4½	$12.00

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Fully guaranteed, all standard makers. We guarantee better quality for same price or same quality for less money. Get our prices before buying. Agents wanted to sell all pertaining to the automobile.

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FRESH STOCK

	New	Used		New	Used
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All other sizes in proportion. Bargains in new and used tubes.

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Tires—New, Fresh Stock

Any Size

28x3	$ 6.80	34x3½	$10.50
30x3	7.10	34x4	15.00
32x3½	10.90	34x4½	18.70

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3500-Mile PRINTED GUARANTEE of actual service with every tire. Send for YOUR copy. State size you use. Write now—RIGHT NOW.

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Welding of all kinds of metals. Cast iron and aluminum a specialty.
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Absolutely Guaranteed Welding

We absolutely guarantee all work done by the OXWELD PROCESS of welding and cutting, including welding cracked or defective cylinders, crankshafts, housings, aluminum crank and transmission cases, etc., etc. Estimates furnished on job and contract welding and cutting of all kinds.

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Send them to us. We do not have to paint them to cover imperfections. The first successful Welders of Aluminum in New England. "Send it to Oxy." **OXY-CARBI CO., 398 George St., New Haven, Conn.**

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Cylinder crankcase and crankshaft welded. Cylinders rebored, $7 to $11 a cylinder, including piston, 8 rings.

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Exclusive and Side Line Salesmen

for spark plugs and accessories. Well established. Good chance for right man.

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State agencies for new patent automobile accessory. Sells to every automobile owner. Chance for live salesman to make money. Address Box 85, Muncie, Indiana.

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I have what you long have been looking for, "THE TANDEM FRONT RADIUS ROD BRACE AND AXLE ALIGNER." No more bent or broken Radius rods; will line up your axle and keep it there, makes your Ford steer easy through sand or mud. Order one now; your money back if not satisfied. Price, $3.50. Special proposition to dealers.

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Rate 25¢ a Line

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FOR SALE—ONE SIX CYLINDER SIX-passenger automobile, well equipped, good condition. Box 208, Cumberland, Md.

MY BIG FIVE-PASSENGER TOURING car, all newly overhauled, brand new top and springs; will sell or exchange for light runabout; have no use for such a big car. Address 111 East Union St., Jacksonville, Florida.

ONE BUICK AUTOMOBILE TRUCK FOR sale cheap if taken at once or will take a small roadster in exchange. Address Paul A. Ruf, Monroe, Wis.

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Parts and Accessories
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A WESTERN FACTORY HAS ON HAND several gasoline farm engines, own make, 3-horse power, which they would job at a bargain; need the money. Address Box E 124, care Motor Age.

WAITE-BARTLETT ELECTRIC STATIC machine, with high frequency coil, full complement of applicators; cost $350; will sell for $75. Call or address 2726 S. 10th Street, Omaha, Nebr.

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Parts and Accessories
WANTED

WANTED—A THOMAS SURREY (TORpedo) Body, 1912 style, upholstered, second hand, cheap. Give description. Lock P. O. Box 822, Greenport, L. I., N. Y.

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FOR SALE OR TRADE—¼ SEC. OF GOOD, level land in Sherman Co., Nebraska. Would take in good brick or cement building if location is satisfactory. A. F. Jenkins, Meadow Grove, Neb.

FOR SALE OR EXCHANGE—HARLEY-Davidson twin cylinder motorcycle; first-class condition, 1913 model. Will consider exchanging for auto or will sell for $175 cash. C. F. Heaton, New Burnside, Ill.

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WANTED—MACHINISTS, WELDERS AND radiator repair men. Address Box E 120, care Motor Age.

WANTED—ROAD MAN FOR RAYFIELD carbureter service station work. Apply to Stein, 1140 Michigan Ave., Chicago.

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AUTOMOBILE MECHANIC OF SEVEN years' experience desires position in the west, south or north part of United States. Will go anywhere on thirty days' trial in truck or pleasure car service. No booze or cigarettes. Address Box E 117, care Motor Age.

POSITION WANTED AS AUTO REPAIRman, 5 years' experience; 23 years old; can give best of references. Address J. R. Williams, Brandon, Wis.

POSITION WANTED BY EXPERIENCED repairman and chauffeur; best reference furnished upon request. John O. Bunting, Burns, Kan.

POSITION WANTED BY EXPERT REpairman; 9 years' experience on all kinds of cars; sober and married; would prefer west or middle west. Box E 126, c/o Motor Age.

WANTED—POSITION AS CHAUFFEUR; two years' driving experience; can do general repairing; state license. Address B. G. Hornke, Blue Earth, Minn.

MECHANIC HAVING SEVEN YEARS' EXperience in driving and repairing, wants position as chauffeur with touring party, more for the outdoor life than salary; have a good education, twenty-six years old, American, no bad habits, first-class recommendation. Address Box E 125, care Motor Age.

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FOR SALE—A FIRST-CLASS GARAGE and harness business combined; only one in good town; good reason for selling. Address Box 93, Prosser, Neb.

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Miscellaneous

REWARD FOR INFORMATION LEADING to the recovery of Regal Underslung runabout stolen May 20 in Chicago. Lic. No. 76,134 Ill., motor No. 2,245; painted black with white stripe; gear shift lever has lock in top. Jas. DeMercer, 2841 Michigan Ave., Chicago.

CYCLECAR, MOTOR, TRANSMISSION, wheels, axles, springs, steering, frames, tires, belts; new; $150.00. Box 311, Fonda, Ia.

CYCLE CAR DRAWINGS, FULL SET OF famous Gila Monster design drawings to build from, saves money, all details worked out. Price, $8.00. Geo. De Witt, Beaumont, Texas.

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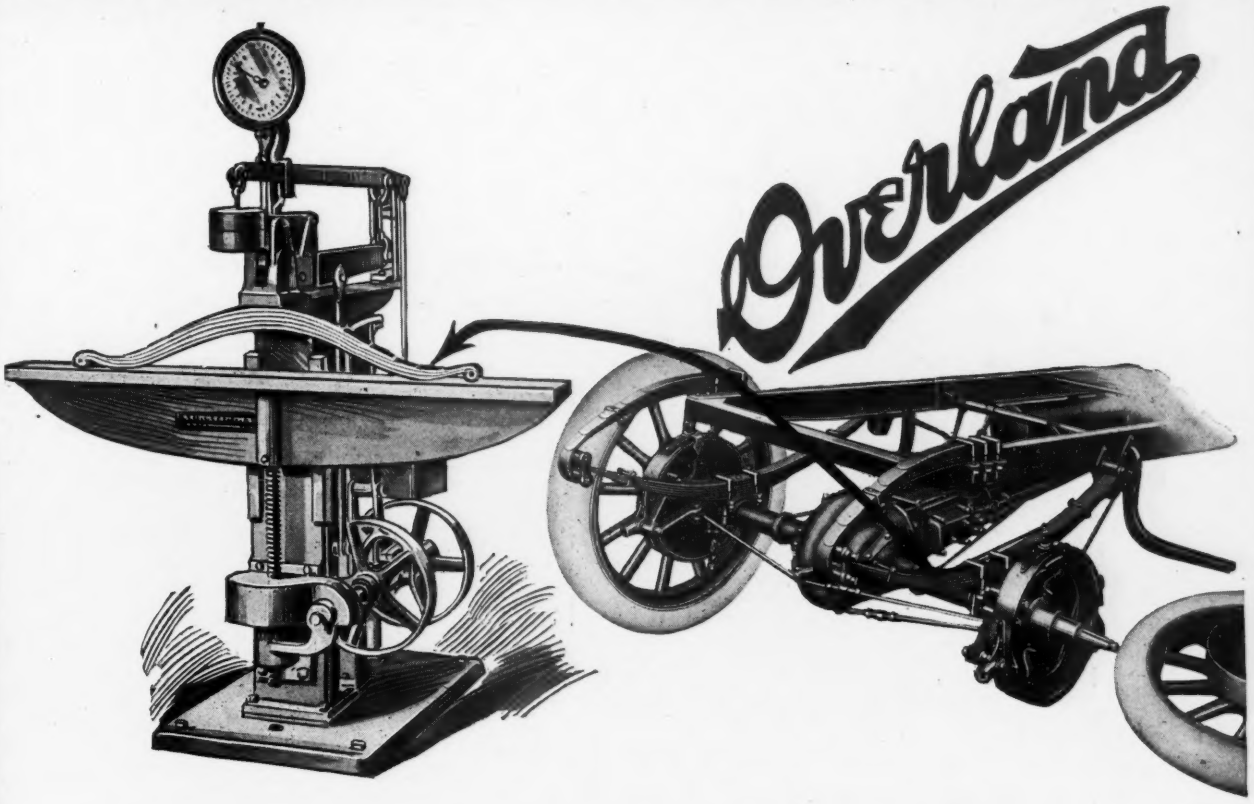

We Prove Overland Spring Quality By The Most Severe Tests Known

THE steel used in Overland springs is as carefully chosen as that in the mainspring of the costliest watch. It must be absolutely perfect before our expert metallurgists accept it as fit for Overland service.

The machine shown above is a special device for testing finished springs. It has a capacity of 6,000 pounds. On it Overland springs are subject to millions of vibrations—a far more severe usage than they can ever receive in actual service.

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And because we manufacture Overlands in lots of 50,000, the buyer gets this perfect product for 30% less than smaller makers must ask for cars of like size and power.

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Manufacturers of the famous Overland Delivery Wagons, Garford and Willys Utility Trucks. Full information on request.

$950

Completely Equipped

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Specifications

Electric head, side, tail and dash lights
Storage battery
35-horsepower motor
33 x 4 Q. D. tires
114-inch wheelbase
Mohair top, curtains and boot
High-grade speedometer
Clear-vision, rain-vision, windshield
Electric horn

$1075

With electric starter and generator

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REMY
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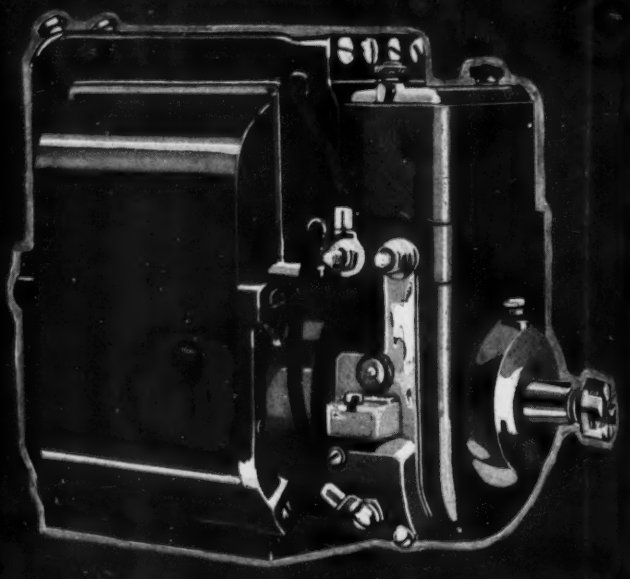
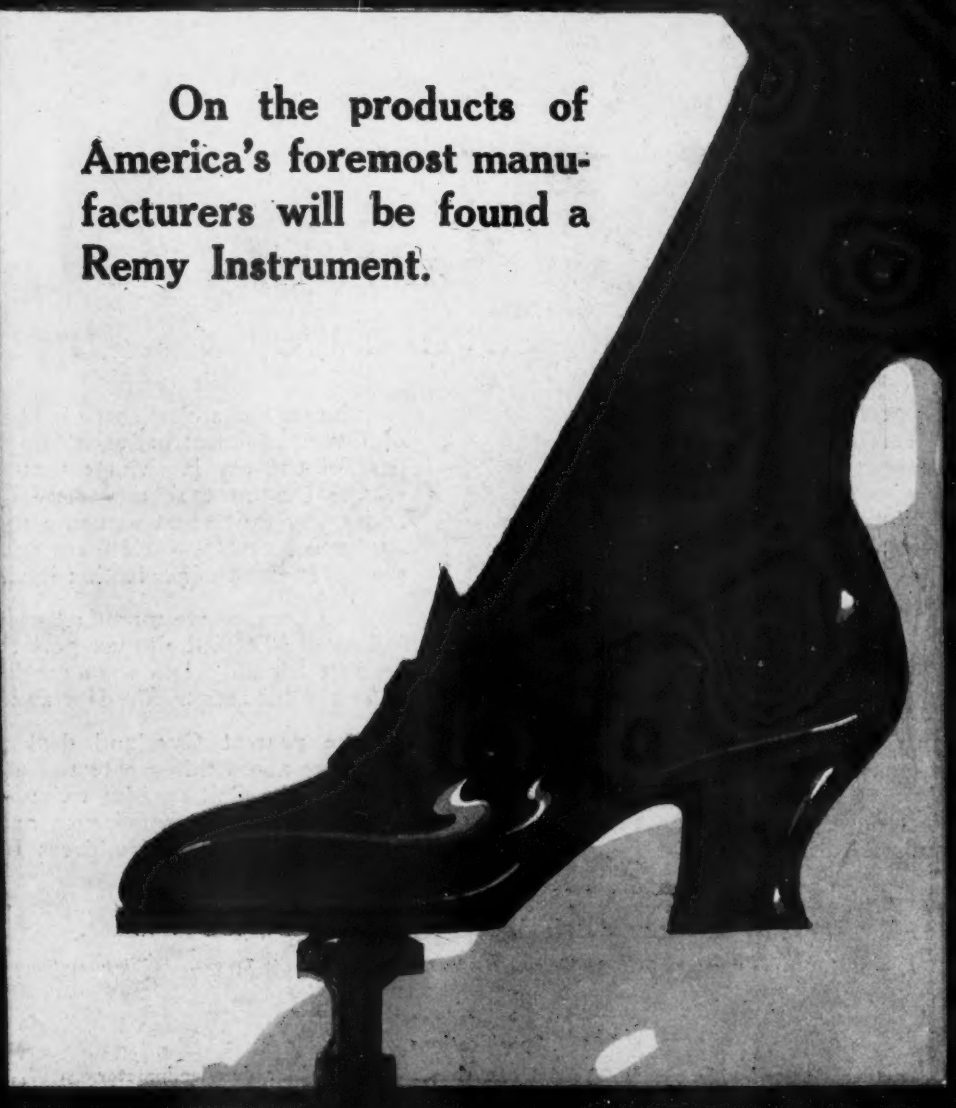


On the products of America's foremost manufacturers will be found a Remy Instrument.



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